Background –

Prior to switching from DWSD, the city of Flint operated a water treatment plant as a standby, backup emergency plant for purposes of reliability in the event that the single pipeline from DWSD failed. In 2009, the water treatment plant was operated in this emergency capacity in two instances (dates/number of days). As a backup emergency plant, the city was required to operate the plant quarterly to demonstrate its ability to produce safe water in accordance with Act 399 and to keep mechanical things in good working order, such as valves, seals, etc. Each time the plant was test run quarterly, samples were taken of raw water quality (describe here) and of finished water (post-filters). Treated water was not put into the distribution system during these test runs, but rather was discharged to the river in accordance with a NPDES Permit (confirm with Steve). The test runs were for demonstration purposes only and to keep the plant operational and staff familiar with operation in the event it was needed in an emergency.

Do we want to note that the original decision was to join KWA and begin receiving water in ~3 years from Lake Huron? It wasn't until DWSD that issued a termination notice that caused the city to consider relying upon the Flint River in the interim because they could not agree on a contract extension with Detroit.

April 2014: Flint terminates service from DWSD and begins using their water treatment plant full time.

What approvals from DEQ were required to do this?

Because Flint had long ago been issued construction permits for raw water pumps to withdraw water from the Flint River, the city was grandfathered under the Water Withdrawal program as were all existing community public water systems. There were no additional DEQ permissions required.

Under Act 399, Michigan's Safe Drinking Water Act, there are no licenses or permit required to operate. Two construction permits were issued prior to the plant changing from an emergency back-up plant to a full time operation. These permits were for small changes at the plant such as new chemical feed equipment, changes to the electrical service, etc.

Summer 2014: Flint experiences several (how many?) water main breaks and has 2 localized (describe) boil water events.
Do we mention the unusually harsh winter that led to an increased number of water main breaks throughout Michigan that year?

Is it unusual for a city to issue boil water advisories? Should the state have been concerned at this point?

During the summer, the city was actively repairing the distribution system. After the switch to the Flint River, it was discovered that there were (how many) broken or closed valves in the city's distribution system. As the city began correcting this problem they did experience issues of bacteria in the distribution system as a result of the repairs. This is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

Complaints are being made that there are taste, odor, and color issues since the switch from DWSD; including rashes and hair falling out. Why didn't the state do something?

DEQ consulted with the city regarding these complaints. The city indicated that they were offering testing for anyone that had issues and that they were not able to verify the complaints. Jugs of discolored water were being brought to meetings, but city personnel were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHM's, it was anticipated that there would be short term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) can and will cause temporary problems as described. Based on information from city personnel, it appeared that the complaints were related to operational activities occurring in the distribution system.

Late Summer 2014: Monitoring for TTHM's in the distribution system identifies that the city has elevated levels and will violate the MCL for TTHM's in subsequent monitoring.

How was this handled? Should this have been a sign that it was a mistake to "allow" Flint to switch from DWSD to the Flint River?

Because the water treatment plant was originally upgraded for intermittent, emergency use, it was not possible to predict Disinfection Byproduct formation until the city began relying upon it continuously. The Flint River had higher levels of organic material and it was not a surprise that the water produced by the city of Flint developed higher disinfection by-products. TTHMs and HAA5s are the result of organic material in the water reacting with the disinfectant. On more than one occasion, DEQ district supervisors and engineers have indicated that continuous use of the Flint River poses an increased microbial risk; an increased risk of disinfection byproducts; will trigger additional regulatory requirements for monitoring; and require significant enhancements at the Flint Water Treatment Plant.

In preparation to rely upon the Flint River, the city installed ozone to help reduce the organic material (known as precursors), but additional measures were necessary. Because TTHM and HAA5 MCLs are calculated based on a running annual average at a specific location, the city didn't actually violate the safe drinking water act standard until the fall, but because it was apparent in the summer of 2014 that the standard would eventually be exceeded, the city was asked to proactively implement measures to address the problem before the violation required them to do so. The city added granular activated carbon to their filters (after receiving a construction permit from DEQ on date?) and levels of TTHMs and HAA5s were reduced. The city returned to compliance with the running annual average (MCL) on (date?).

Issues around lead/copper:

Why didn't DEQ require a corrosion control plan from the city prior to bringing the water treatment plant on-line in April 2014?

DEQ believed there were two ways under the lead/copper rule to deem a water supply as providing "optimal corrosion control" – either by sampling and determining through a

calculation that the supply is "optimal" or by installing treatment. DEQ staff thought it was appropriate to call for the city of Flint to perform two 6-month rounds of monitoring to demonstrate if the city was practicing optimal corrosion control treatment. According to state regulations (R325.604f (2) (iii), a system can demonstrate that it is "practicing optimal corrosion control" by sampling in two, consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the Flint River has 0 ppb lead, the city would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods.

In addition, the city of Flint had been purchasing water from DWSD that was treated for corrosion control. It was DWSD that was considered as having optimized corrosion control at that point. Since the city of Flint had not been the supplier of water before, DEQ did not require the city to "maintain" corrosion control for which it was not responsible. It couldn't "maintain" something that it wasn't doing. As we stated previously, we believed Flint should have been afforded the same opportunity that all other large water systems were initially granted to demonstrate optimal corrosion control treatment through full scale monitoring. For these reasons, two 6-month rounds of monitoring, as required by the lead/copper rule were felt to be appropriate to determine whether or not optimal corrosion control was being achieved.

The first round of monitoring conducted July 2014 through December 2014 resulted in a 90th percentile of 6 ppb lead. Why didn't the DEQ require the city take actions at this point?

A 90th percentile lead/copper result of 6 ppb for lead is not unusual. Many water supplies in Michigan and across the country have 90th percentile levels of lead greater than this. Even systems that have installed treatment and are considered optimized by definition can and do have levels above 5 ppb.

In February, EPA staff inquired about corrosion control and whether the city was providing treatment to control corrosion. What was the DEQ's response?

DEQ indicated that the city was in compliance with the lead/copper rule. 90th percentile levels were below the Action Level and not unusual. The city was already conducting the second round of monitoring which would provide for a determination of whether or not additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the lead/copper rule that lead or copper results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile action level in the rule.

An e-mail from Steve Busch indicated that the city was practicing corrosion control. Why was this said?

This was a misstatement. What was meant was that the city was performing the required monitoring to determine whether or not they were "practicing optimal corrosion control". It was clarified in follow-up telephone conversations with EPA.

In April, EPA staff visited Flint and sampled a residence at 212 Browning. High levels of lead were present? Why wasn't this seen as a potential system-wide problem?

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The reason for this connection is unknown. The city replaced the lead service line. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem. There was also no reason to believe that this matter was anything other than a site specific condition.

A draft memo, dated June 24, 2015, from an EPA staff person claimed that DEQ had inappropriately handled the sampling at the city and that corrosion control should have been required before start up. What is DEQ's response to these allegations?

DEQ never received this memo and EPA staff have confirmed that EPA never sent us this memo. A copy of the draft document was downloaded from the ACLU website. On June 30th, an e-mail was received from EPA that indicated it was a draft memo that had been shared with the homeowner where sampling occurred and that once management had a chance to review the memo they would provide a final copy to DEQ. A final copy was never received. Also, EPA indicated in this same e-mail that a conference call to discuss the issues raised in the memo was scheduled for July 21st between the agencies.

During the July 21st call, EPA provided a rule citation (for the first time) indicating that (insert). DEQ provided their interpretation of the lead/copper rule. EPA indicated that they would consult with their attorneys and seek a clarification regarding the two different interpretations. To date (October 29th), DEQ has not received any feedback from EPA regarding the state's interpretation.

There is on-going criticism that the DEQ provides inappropriate guidance to water supplies regarding pre-flushing of taps prior to lead/copper sampling? Explain DEQ's rationale for doing this.

The lead/copper sampling protocol is designed to standardize sample collection and is not the same protocol that would be used for an exposure assessment. Different sampling is done for different purposes.

Under the lead/copper rule, samples collected must be "first-draw' 1 liter samples collected from kitchen or bathroom taps at EPA designated, high-risk locations after overnight stagnation. It is recognized that this may or may not be the highest level of lead that could be found at a residence. However, it does provide the water supplier with information about efficacy of their treatment process and an indication of how the water may be reacting with plumbing in the system.

The lead/copper rule is the only rule that requires compliance monitoring to be performed by homeowners. In order to simplify the instructions and ensure consistent sampling protocol and results, DEQ recommends that a sample tap/outlet be run the night before it is going to be sampled so that the sampling location is representative of a tap experiencing typical household

use (as required by the lead/copper rule). Historically, there were problems with homeowners sampling from locations that had not been used for days, weeks or even months. The recommended/required stagnation period under the lead/copper rule is 6 to 18 hours. To accomplish this across the board, DEQ policy is to recommend that the tap be used or use be simulated on the night before it is going to be sampled. It is interesting to note that EPA has incorporated similar sampling protocols into tap sampling programs at schools and day care centers.

If there is a lead service line in the house, then a first draw sample under this condition will not contain water that has sat stagnant for some time in that service line. However, not flushing the tap the night before will also not likely result in capturing a first draw sample that has sat stagnant in that lead service line. Only the tap that is going to be sampled is required to be stagnant. If there is a toilet or a dishwasher nearby, they can still be used. And it is impossible to predict whether there is water in that particular line that has spent any time at all resting quietly for any period of time in the service line and only happens to be poised for withdrawal at that particular tap at that particular moment. Only a site specific evaluation of a household plumbing system along with a site specific calculation of the volume of water in the plumbing system and the volume of water in the lead service line would potentially provide for a sample that has rested in the service line assuming that no water has been used in the house during the entire time of "resting". This level of complexity is not a practical approach for a community to employ or for water systems across the country to accomplish when they must rely upon homeowners to collect samples. The lead/copper rule is imperfect. But the instructions provided by DEQ provide for a consistent sampling protocol that is easily followed by homeowners and results in samples collected that meet the legal requirements of the lead/copper rule and the intention of providing water quality information upon which further regulatory decisions should be made. The lead/copper rule is intended to assist water suppliers with evaluating their treatment process and the effects of the water on plumbing systems. It is not a tool to assess individual exposure.

After the July 21st call with EPA where they provided a regulatory citation and their opinion that the DEQ had not followed the required protocol to require treatment, what steps were taken by DEQ to address the situation?

By the time the July 21st call occurred, the city had completed their two 6-month rounds of lead/copper monitoring. This monitoring showed that the city needed to install corrosion control measures. On August 17th, the DEQ wrote the city requiring the city to perform a study and install corrosion control treatment in accordance with the safe drinking water act. We also recommended Flint significantly accelerate this action and not take the time allotted by the regulations for selecting and installing OCCT. EPA indicated during this call that they concurred with the proposed actions to be taken by DEQ.

When DEQ met with city residents on August 4th, they were still saying that the water was safe even after the sampling was done and it showed that corrosion control was necessary. Why the contradiction?

At the time of this meeting, all sampling results to date indicated that lead levels were within typical ranges seen in other water systems and below the action level established in the rule. It was acknowledged that the results showed that the city of Flint needed to provide optimal

corrosion control treatment and that would soon be required. In addition, data provided by our colleagues at the Department of Health and Human Services indicated that there was no significant change in children's blood lead levels within the city. The evaluation showed that blood lead levels were following historical seasonal patterns and there was no indication that drinking water was contributing to an increase. This provided backup confirmation (at that time) that the path followed was correct.

When the V-T researcher raised the alarm that the sampling required by DEQ was wrong and that levels of lead in the city were much higher than previously thought, why didn't DEQ investigate these claims and follow up on this information?

DEQ was informed in late August that a study was underway in the city and that samples taken appeared to be much higher than those taken under the lead/copper rule. Since we were not provided information regarding protocol used for the study, the DEQ could not adequately comment on the comparison between the two data sets. It was not however, unexpected that a different sampling protocol could yield higher results. Since the required two 6-month rounds of monitoring had already been completed at this point and the city had been notified of the requirement to install treatment, there were no additional actions deemed necessary by the agency at this point. The city had not exceeded the lead action level, they were actively pursuing treatment on an accelerated schedule, and DHHS information regarding blood lead levels in the city indicated that there was no significant change since the switch.

Why did DEQ change their position in September and agree that lead is a problem in Flint?

As soon as the DHHS Chief Medical Officer determined that there was a correlation between blood lead levels in children in certain zip codes and the switch to the Flint River, DEQ responded. Actions were taken within a week to address the concerns raised.

Why is DEQ admitting it made a mistake?

If EPA's interpretation is correct and the city of Flint was required to maintain corrosion control and should not have been allowed to switch sources without maintaining corrosion control, this wasn't done. All indications are that the protective coating that was in place as a result of treated water received from DWSD has been eroded and that lead leaching has increased during the time that there hasn't been treatment. This was the mistake. However, DEQ staff acted in good faith. We believed that the city was were implementing the lead/copper rule appropriately with all of its nuances in sampling and limitation on compliance monitoring. The lead/copper rule establishes a mechanism for a new supply (when not previously serving water to the public) to conduct two 6-month rounds of monitoring to determine whether or not the supply can be deemed optimal by definition or whether treatment must be installed. It did not anticipate a system serving greater than 50,000 residents would disconnect from a regional supply to become its own supply with a new source and different treatment methods. It was these circumstances for which DEQ employees were sincerely applying regulations as they interpreted them to ensure compliance and public health protection.

Attachment to the article

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THE SENATE
STATE OF MICHIGAN

November 5, 2015

Hon. Arlan Meekhof
Senate Majority Leader
P.O. Box 30036
Lansing, MI 48909-7536

Majority Leader Meekhof,

I am writing to formally request that the Senate undertake hearings into the Flint water crisis. It is our constitutional duty as the legislative branch to oversee the work of the executive branch, to ensure that the state is spending taxpayer dollars wisely, and to protect the health and safety of Michigan residents. In the handling of the Flint water case, failures at multiple levels of government led to my community — and particularly its children — being poisoned. We need to make sure that the executive branch is faithfully executing the laws passed by this body and protecting all Michigan taxpayers by making sure the $9.35 million in state funds appropriated for the Flint water crisis are used correctly. More importantly, it's our job to provide for the safety of Michigan's kids. In that, we have failed the most vulnerable residents of Flint.

It's true that there are currently some investigations and calls for investigations regarding the Flint water crisis. On October 21, Governor Snyder announced the formation of a Flint Water Task Force to investigate the situation. Additionally, Congressman Dan Kildee and I have both called for the EPA to investigate MDEQ's involvement, and I separately called for the Auditor General to expand its audit for the Office of Drinking Water and Municipal Assistance to include some inquiries related to the crisis in Flint. Each of these is a step in the right direction, but they are simply not enough.

In order to ensure the public has access to hearings and findings on the Flint water crisis, our legislature needs to conduct an investigation of its own. Each investigation and potential investigation, whether it be by the Governor's task force, the auditor general or the EPA, has a significant problem: a branch of government or agency is investigating themselves. Moreover, none of these inquiries have any obligation to make public evidence or findings. Governor Snyder's Flint Water Task Force lacks subpoena power and will not be required to take testimony under oath; the same is true of EPA and auditor general investigations. Conducting a legislative investigation, before or concurrently with other investigations, will have the added benefit of forcing these other investigations to reckon with any evidence and testimony the Senate makes public. An independent investigation is crucial to determine what went wrong, how responsible parties can be held accountable, and how we can ensure something like this never happens again. I believe the legislature — specifically the Senate — is the body most capable of conducting such an investigation.

About a decade ago, Washington D.C. experienced a similar crisis with lead in its water. In that case, Congress and the D.C. Council each held a total of 15 oversight hearings (D.C. Council held 11, and Congress held four). Additionally, the EPA, the U.S. Government Accountability Office, D.C.'s inspector general, and the D.C. Council each launched their own investigations. Multiple inquiries, each with a slightly different objective, were able to fully capture the fragmented governance that precipitated the problems in the first

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THE SENATE
STATE OF MICHIGAN

place. The Flint water crisis deserves no less attention than the water crisis in Washington, D.C., and it is up to the legislature to do its part in scrutinizing this unconscionable failure of government.

I am asking that you direct an appropriate Senate committee to conduct an investigation and series of hearings regarding the Flint water crisis. Although I think a proper investigation could consume months, I've enclosed a proposal for a series of six hearings to be completed by the end of this year. The proposal also contains background on the Flint water crisis, a more robust six-month inquiry option, and a list of some of the current questions about the Flint water crisis that need to be answered. I am willing to make my staff available to do as much of the work as possible to facilitate the oversight process.

New leadership brings with it new opportunities. Your decision to form the Senate's new Oversight Committee is a laudable first step toward this body taking seriously its duty to exercise oversight over the affairs of this state. It's time to take the next step and actually uphold that duty. Please contact me if you have any questions, concerns, or if there is anything I can do to make hearings more likely.

Jim Ananich
Senate Democratic Leader
District 27

encl:
Flint Water Crisis Inquiry Proposal

cc:
Governor Rick Snyder
State Representative Sheldon Neeley, District 34
State Representative Phil Phelps, District 49
Mayor Dayne Walling, City of Flint
Mayor-Elect Karen Weaver, City of Flint
State Senator Mike Shirkey, Chair of Michigan Senate Committee on Health Policy
State Senator Dale Zorn, Chair of Michigan Senate Committee on Local Government
State Senator Peter MacGregor, Chair of Michigan Senate Committee on Oversight

MBT

Michigan

Ananich seeks subpoena power in call for legislative hearings on Flint water crisis



Virginia Tech professor Marc Edwards shows the difference in water quality between Detroit and Flint after testing, giving evidence after more than 270 samples were sent in from Flint that show high levels of lead during a press conference on Tuesday, Sept. 15, 2015 outside of City Hall in downtown Flint. *(Jake May | MLive.com)*



[http://connect.mlive.com/user/joosting/index.html] By Jonathan Oosting | joosting@mlive.com [http://connect.mlive.com/user/joosting/posts.html]
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on November 05, 2015 at 12:50 PM, updated November 05, 2015 at 1:21 PM

LANSING, MI — Senate Minority Leader Jim Ananich on Thursday formally requested legislative hearings on **the Flint water crisis [http://topics.mlive.com/tag/flint-water/posts.html]** and response by the Michigan Department of Environmental Quality.

"In the handling of the Flint water case, failures at multiple levels of government led to my community — and particularly its children — being poisoned," Ananich said in a letter to Senate Majority Leader Arlan Meekhof, referencing high lead levels found after a switch to Flint River drinking water.

"We need to make sure that the executive branch is faithfully executing the laws passed by this body and protecting all Michigan taxpayers by making sure the $9.35 million in state funds appropriated for the Flint water crisis are used correctly."

Gov. Rick Snyder has already appointed a task force to review the Flint water crisis. The federal Environmental Protection Agency is also investigating, and the state Auditor General recently agreed to expand an ongoing audit of MDEQ's drinking water division.

But Ananich, **in his letter [http://senatedems.com/ananich/wp-content/uploads/sites/3/2014/11/2015.11.5_ananich_letter_to_meekhof_final.pdf]**, noted that the task force lacks subpoena power that a Senate committee could use to compel testimony. He pointed out that none of the state or federal probes will require sworn testimony and highlighted a common characteristic: "a branch of government or agency is investigating themselves."

The Flint Democrat proposed a series of six legislative hearings by the end of the year "in an appropriate" Senate committee, such as the newly formed Oversight panel.

Meekhof, R-West Olive, did not sound immediately enthused by Ananich's proposal and does not appear prepared to call for hearings any time soon.

"He and I have been talking about that, but I'd like the folks that are in charge of gathering data and information to do that," Meekhof said, noting that the Senate could have a busy couple months with energy and Detroit education legislation in the pipeline.

Meekhof also offered support for MDEQ Director Dan Wyant, who has faced criticism over his department's handling of the water crisis.

"I believe they will find solutions and they will find the thing that need to be corrected," Meekhof said. "I have very high confidence in the director."

Flint began drawing drinking water from the Flint River in April of 2014, while the city was under control of a state-appointed emergency manager. City Council had previously approved a long-term plan to move off Detroit water and join the new Karegnondi Water Authority but did not vote on using river water in the interim.

Wyant recently replaced the head of the Office of Drinking Water and Municipal Assistance, acknowledging that the state had **enforced the wrong federal standards [http://www.mlive.com/news/flint/index.ssf/2015/10/us_epa_task_force_will_advise.html]** for treating Flint River water for more than 17 months, failing to require that the city make it less corrosive.

Ananich said public hearings in a legislative committee would further help the public understand the crisis and help the state or other cities avoid similar problems in the future.

"The solution is going to be ongoing when it comes to helping these kids that have brain damage because of the lead," he told reporters after session. "But I think this helps get some accountability. I think citizens deserve that. I think taxpayers deserve that. This could be one way to do it."

Jonathan Oosting is a Capitol reporter for MLive Media Group. ***Email him****, find him on* ***Facebook [https://www.facebook.com/jonathan.oosting]*** *or follow him on* ***Twitter [http://twitter.com/jonathanoosting]***.

FLINT WATER

Ananich seeks subpoena power in call for legislative hearings on Flint water crisis [http://www.mlive.com/lansing-news/index.ssf/2015/11/ananich_see

Bottled water donations continue to trickle into Flint [http://www.mlive.com/news/flint/inde

New EPA report warns of potential large-scale lead releases in Flint water [http://www.mlive.com/news/flint/inde

U.S. EPA will conduct 'full review' of Flint water crisis [http://www.mlive.com/news/flint/inde

Senator Ananich says water woes will have lasting impact on Flint community [http://www.mlive.com/news/flint/inde

All Stories [http://topics.mlive.com/tag/flint-water/posts.html]

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Lead & Cu Sampling

DRAFT – WORK IN PROGRESS

Protocol for Collecting Water Samples at Schools for Lead Analysis

The following is a step-by-step procedure to ensure samples are collected in a systematic, consistent manner to provide meaningful results. By following the below procedures school and health officials will have information to be able to identify and correct sources that contribute lead into drinking water. The recommended procedures are:

- With the assistance from Department of Licensing and Regulatory Affairs (LARA) staff, conduct an on-site assessment of the building plumbing to identify plumbing components of concern and prioritize sample sites.
- Genesee County Health Department staff collects the samples from prioritized sites and in the sequence recommended by LARA.
- Genesee County Health Department staff submits the samples and appropriate paperwork to the DEQ certified drinking water laboratory
- Laboratory performs analysis and informs DEQ-ODWMA staff of the results.
- DEQ informs DHHS of test results, and they jointly interpret the results.
- DHHS staff relays the results to school officials and confers on any follow-up or corrective remedies that may be needed.

Step 1 – Prepare for On-Site Assessment

In order to assist LARA staff to identify and prioritize sample sites, school staff should compile, collect, and review any records pertaining to the building plumbing. This includes building permits, plumbing permits, as built plans, and information about the service line and all potable water pipes, fixtures and appurtenances within the building. At a minimum, a diagram of each floor layout should be provided. In addition, answers to the following questions will help streamline the on-site assessment process.

- When was the facility built?
- Have new buildings or additions been added? If so, when were they added? If built since 1986, were lead-free plumbing and solder used?
- When were the most recent plumbing repairs made and where were they located?
- What are the potable water pipes in your facility made of and what is their location? Options include: lead, brass, copper, plastic, galvanized metal and other materials. What materials were used to solder the potable water pipes in your system? Are brass taps, fittings or valves used? Note the locations.
- How many of the following outlets provide water for consumption: Bubblers, ice makers, water coolers and kitchen taps. Note their location. Include taps that might be used for making coffee or preparing formula.
- What brands and models of water coolers (cooled drinking fountains) provide water in your facility and what is their location?
- Do faucets have accessible screens and have they been cleaned?
- Can you detect any signs of corrosion, such as leaks, rust-colored water or stains?
- Is any electrical equipment grounded to water pipes?

- Are there any records of previous water testing?

Step 1 – Arrange for On-site Assessment with LARA Staff

LARA staff will contact school officials/staff and set a date and time for the assessment. A school representative familiar with the building layout and plumbing system should accompany LARA staff as they conduct the assessment. A room reserved for records review should also available.

Step 3 – Prioritize Sample Sites and Sampling Sequence

It is recommended that all faucets, taps and outlets that are used regularly by students and staff for drinking, cooking, making coffee or food preparation will be sampled. High priority sites would include:

- Drinking Fountains (both bubblers and water cooler style).
- Kitchen Sinks, faucets or taps.
- Breakroom, classroom, teachers' lounge or other sinks known to be or visibly used for consumption (water glasses or coffeemaker and/or cups are nearby).

LARA staff will assign a sample site Identification (ID) number for each sample site and the order in which each site is to be sampled. This number will reflect the type of tap/outlet and location. Sites closest to the service line are to be collected first, then in a sequence as they get farther from the service line until the site the farthest away is sampled last. This will minimize the chance that the piping is not flushed by a downstream or other sample location prior to collecting the samples at that site.

LARA staff will also identify any water coolers that should have been removed under the Lead Contamination Control Act (LCCA) in 1988. The LCCA mandated the repair, replacement or recall and refund of drinking water coolers with lead-lined water tanks. LARA staff will confirm that there are no recalled water coolers on-site. Any coolers that should have been removed will be marked for removal or replacement.

Step 4 - Labelling the Sample Sites and Preparing Labels for the Bottles

Coding Scheme for Water Outlets

A drinking water bubbler (DW) on the 2nd floor (02) of the middle school (MID), the 15th outlet counted, might be coded as follows.

- MID- 02- DW-015
- DW= drinking water bubbler
- WC = water cooler (chiller unit)
- CF = classroom faucet
- KC = kitchen faucet, cold
- KH = kitchen faucet, hot
- EC = home economics room, cold
- EH = home economics room sink, hot
- BF = bathroom faucet
- NS = nurse's office sink
- SC = service connector

In addition to the unique outlet code, a unique sample identifier is necessary since more than one sample will be taken from an outlet. A flush sample would also require a unique identifier. For example, the first draw (P), flush (F1) and flush (F2) samples taken for the above outlet would be MID- 02- DW-015-P-01, MID- 02- DW-015-F-01 and MID-02-DW-015-F-02.

DRAFT DELIBERATIVE. NOT SUBJECT TO FOIA.

- P = primary (first draw) sample
- F = flush
- 01 = first flush sample at 30 seconds
- 02 = second flush sample at 2 minutes

Step 5 – Prior to Sample Collection

Once LARA staff has labelled each outlet, school personnel should ensure that the labels are maintained. Even after the initial sampling, it will be important to keep a record of each tap designation so that any future or follow-up sampling can be correlated to the correct outlet.

Also, since drinking water has not been consumed from taps within the school buildings for several weeks, it is important to flush the taps the afternoon prior to the day of sampling. That is, after school is out for the day, school personnel should run each tap for several minutes to clear the faucet.

Step 6 – Collect the Samples

After the sites and order of collection have been determined by LARA staff, and the taps flushed by school personnel, samples can be collected by Genesee County Health Department staff. In addition, make sure to inform all other staff including teachers, maintenance staff, parents and students of the sampling plans and for the need to not use any of the outlets or water in the building the morning of sampling. Samples must be collected before school opens in the morning. Use of bathrooms, etc. would draw fresh water through the piping system and alter the effects of stagnation.

Each outlet should be labelled and posted **"DO NOT USE"** so that no water is used before sampling occurs. The sample sequence will be determined by LARA so that sampling will occur closest to the water main/service line provided by the city.

Sampling containers will be provided to Genesee County Health Department staff from the Michigan Department of Environmental Quality Drinking Water Laboratory.

1. Four samples will be collected from each designated sample site. There will be four 125 milliliter (ml) samples collected at each outlet. Sample units for this evaluation/survey will be designated 32CC.

2. Collect all water samples before any water is used. Ideally, the water should sit in the pipes unused for at least 8 hours but not more than 18 hours before a sample is collected.

3. Samples should not be collected the morning after a vacation, weekend or holiday. These results will not be representative because of the extended contact time with the water.

4. Notes should be taken at each sampling location regarding any treatment device that may be present (e.g., is there an in-line filter at that location) and whether the outlet/tap has an aerator present. Document other noteworthy items for each location.

5. Do not remove the aerator if there is one.

6. The four samples from each site are to be collected as follows: 2 – consecutive first draw samples, after a 30 second flush, and a 2 minute flush as follows:

DRAFT DELIBERATIVE. NOT SUBJECT TO FOIA.

a. After the appropriate 8 – 18 hour stagnation time, place the first bottle under the tap, open the tap to produce a slow, steady "pencil thin" flow and fill the first bottle to the appropriate level and immediately fill a second bottle without a break in stream (do not turn off the tap between the first and second bottle and do not allow water to run down the drain in between the first and second bottle).
b. Turn off tap. Cap, label the first and second bottles, and record sample information on sample recordkeeping/chain of custody form.
c. Turn on tap as before and after 30 seconds, fill the third bottle.
d. Turn off tap. Cap, label bottle, and record sample information on sample recordkeeping/chain of custody form.
e. Turn on tap as before and after 2 minutes, fill the fourth bottle.
f. Turn off tap. Cap, label bottle, and record sample information on sample recordkeeping/chain of custody form.

7. Make sure to mark the bottles as "first draw 1", "first draw 2", "30 sec flush" or "2 min flush" and also indicate this information on the sample submission form.

8. Assign an appropriate sample Identification (ID) number to each sample collected. Record this number (including the flush time) on the sample container and submission form.

9. Collect the remainder of the samples from all designated sites in the pre-determined order as recommended by LARA.

10. Deliver or ship the samples to the lab as instructed.

How to Collect an Initial (First Draw) Sample

- Make sure you have clean hands.
- Complete the sample recording form.
- Only use containers (125 ml) supplied by the DEQ laboratory.
- Containers should not be opened until you are ready to collect the sample.
- Sampling containers that have been compromised in any way, e.g., by being touched on the threads or the interior surfaces, must not be used.
- Keep food and drink away from the sample and its container.
- Make sure no water has been withdrawn from the tap or water fountain before you collect the sample.
- Place the container under the faucet or drinking water fountain that is being tested and collect 125 ml of water.
- If a faucet is being tested make sure you turn on the cold water tap.
- Turn on the water and fill the container without allowing any water to run down the drain.
- Close the container according to the instructions from your certified lab.
- Make sure the container is labeled with the same information from your sample recording form.
- Prepare the container for shipping according to the DEQ lab's instructions.
- Samples must be delivered to the lab within 14 days of collection for proper testing.

How to Collect Flush Samples

Before the first flush sample is collected, allow the water to run down the drain for 30 seconds. Then collect a sample using the same protocol as above.

Before the second flush sample is collected, allow the water to run down the drain for 2 minutes. Then collect a sample using the same protocol as above.

Step 6 - Laboratory performs analysis

Samples delivered to the DEQ Drinking Water Laboratory will be analyzed in accordance with the Laboratory Services Standard Operating Procedure Document SOP #800 Revision #4 Effective Date 10/2015.

Applicable analytical methods will be in accordance with Method for Determination of Metals in Environmental Samples, Supplement I, U.S. Environmental Protection Agency, Method 200.8, 1999 Revision 5.5.

All Method Detection Limits shall be performed according to the Code of Federal Regulations 40 CFR, Part 136, Appendix B.

Analytical quality control will be in accordance with SOP #800 Revision #4.

Step 7 – Laboratory reports results to DEQ – ODWMA and DHHS staff

DRAFT

Thelen, Mary Beth (DEQ)

Subject: Director's 8:00 Exec Team List for Monday, Nov 2,, 2015

Dear Executive Team attending the 8:00 Monday morning meeting:

Executive

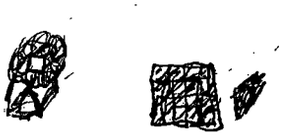
- City of Flint Drinking Water and Action Steps
- Mid-Managers Retreat Updates – Make up session November 12
- Future SMT Meeting Agenda Items
- Directors' Schedule
- Any follwoup from the meeting with the Governor on Enbridge – September 23
- Any followup from the meeting with the Governor on Budget – October 20
- Director's Advisory Council for 2016 Agenda Items
- Michigan Petroleum Pipeline Task Force – Implementation of Recommendations
- Michigan Pipeline Safety Advisory Council - Next Meeting December 14
- Employee Survey Results – Action Plan
- Organizational Excellence
- Invasive Carp Updates
- District Visits – Plan one for Detroit Office?
- Enforcement Policy (signed)
-

Admin (Amy Epkey)

- 2017 Budget Development
- Groundwater Fees
- Updates on Underground Storage Tank Authority
- Michigan Strategic Water Fund
- Administration Division In-Service Suggestions
- Budget

AQD

- 111d Updates
- Air Rules



OGL

- Water Strategy

OEA

- Action Learning Teams
- Environmental Justice
- Compliance Assistance/Customer Service/Employee Engagement

ODWMA

- City of Flint Drinking Water

over

- SAW Grants

OWMRP

- Recycling Council Updates
- Ontario Power Generation and MHSA

OOGM

- High Density Oil & Gas Development Workgroup

WRD

- Water Use
- Lake Erie Issues
- Enbridge
- Waters of the US/Wetlands/Blueberries
- DWSD
- Part 31 Water Rules Strategy
- Part 5, Part 13, Part 23, Part 22

RRD

- 201 Amendments
- 201 Criteria Workgroup

Thanks.

Mary Beth Thelen
Management Assistant to Director Dan Wyant
Department of Environmental Quality
Constitution Hall, 6th Floor South
Phone: 517-284-6712 or 284-6700 (new numbers)
Fax: 517-241-7401
Thelenm2@michigan.gov

Senior Management Team Meeting
Monday, November 2, 2015
8:30 a.m. – 9:30 a.m.
Great Lakes Conference Room
AGENDA

Call-In No. for District Coordinators: 1-877-873-8018; Access Code: 3467059#

Director's Report

Chief Deputy Director's Report

Division/Office/District Updates

Discussion and Future SMT Meeting Agenda Items

Next SMT Meeting: November 16, 2015

Future Items of Discussion:
Mid-Managers Retreat Debrief (November 16)
DEQ Travel Regulations (November 16)
Budget
Long Term Funding
Organizational Excellence
Engagement
Communication Issues

Flint Drinking Water Action Plan Update

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

Key Actions:

- An 18-Point Partnering Plan was developed to guide DEQ staff on the Flint water issue. The document focuses on areas of concern and identifies key partnerships. The issues in the Partnering Plan address short-term, intermediate term, and long-terms goals. This document will be reviewed at least weekly, and actions by DEQ staff with respect to the Partnering Plan will be documented. The Partnering Plan has become a standing agenda item and a central focus for the internal action plan meetings.

- On November 20 the weekly meeting was held at Flint between DEQ staff and city of Flint officials. Mayor Karen Weaver was present at the meeting. This was Mayor Weaver's first time in attendance at the weekly meeting. After introductions were made, Mayor Weaver was given an overview of the data from the free homeowner's testing. Mayor Weaver was informed that the samples were from any Flint resident who wished to have their water tested and, as such, were not necessarily representative of the site selection criteria as specified in the lead and copper rule, but with that said, the results were encouraging. Mayor Weaver was informed that over 3/4 of the samples had results of 5 parts per billion (ppb) or less and that approximately 92 percent of the sample results were at 15 ppb or less. It was also stressed to Mayor Weaver that, although the results were encouraging, there were also pockets of concern where the lead levels in the drinking water were significantly above 15 ppb.

  There was also discussion about making sure that water sample results were kept in context. In order for an individual to be sure with respect to their exposure to lead, they should have their blood tested. Individuals with an elevated blood level (EBL) would then be encouraged to have an EBL investigation done to evaluate all potential exposure pathways. There was then discussion as to what the EBL investigation entailed and how the water testing was being incorporated into the EBL.

  The meeting ended with an invitation by the DEQ to Mayor Weaver to come tour the DEQ's Laboratory to see first-hand how samples were analyzed. Mayor Weaver indicated that she would be very interested in a tour and that a date would be set up.

Positions:

- There are no new positions to report since last week.

Concerns:

- There are no new concerns to report since last week.

Significant Events:

- A Frequently Asked Questions document was provided to the Governor's Flint Water Task Force (Task Force) on November 16. DEQ staff subsequently met with the Task Force on November 18.

Changes from Previous Report:

- DEQ staff provided comments on the final draft of the DHHS protocol for EBL investigations. The sampling protocol will utilize 14 drinking water samples that will be used to identify potential sources of exposure to lead located in the plumbing system of residential dwellings.

- DEQ staff provided comment on the draft sampling protocol that the city of Flint is proposing to use for compliance monitoring for the lead and copper rule. This document has been forwarded to staff at the U.S. Environmental Protection Agency (EPA) for additional comment.

- On November 19 DEQ staff contacted EPA staff via e-mail regarding a request by the city of Flint for guidance on a corrosion control treatment evaluation for Karegnondi Water Authority source water use at the Flint Water Treatment Plant. A meeting has been scheduled for December 11 to discuss the issue with all parties.

- DEQ and DLARA staff conducted a plumbing assessment of Neithercut Elementary School in Flint on November 20.

- DEQ and DLARA staff conducted school sampling at Neithercut Elementary School in Flint on Saturday, November 21.

- A draft report for Eisenhower Elementary School was completed and is awaiting final publishing and will then be posted to the Flint water Web site: www.mi.gov/flintwater.

- Draft reports for Brownell K-2 STEM Academy and Pierce Elementary Schools are in progress and near completion.

- DEQ staff has been in meetings with the Office of the Auditor General audit team and have provided information and documentation as requested.

Other Item:

- Attached is the 18-point Partnering Plan that will guide the efforts of the DEQ regarding the Flint water issue.

Prepared by: George Krisztian, Flint Action Plan Coordinator
Laboratory Director
Department of Environmental Quality
Telephone: 517-284-6719
Cell: 517-420-5897
November 23, 2015

Department of Environmental Quality
18-Point Partnering Plan

1. **After Action Plan Frequently Asked Questions will be ready by noon on November 16, 2015**

   - First version complete – updated as needed

2. **School test data**

   - School reports to be expedited
   - Steve Busch creates summary reports
   - George Krisztian creates summary spreadsheets

3. **Blood exposure**

   - DHHS is lead on providing data

4. **Meeting with Mayor Karen Weaver**

   - Harvey Hollins lead – Dan Wyant, Jim Sygo, and George Krisztian to attend

5. **Messaging our Partnering Plan**

   - Provide ongoing public updates regarding Governor's 10-point plan
   - Continue emphasis on the availability of free testing for Flint residents
   - DEQ's Office of Environmental Assistance to direct the public to the Flint water Web site: www.mi.gov/flintwater

6. **Sampling Protocol**

   - Establish alignment with the U.S. Environmental Protection Agency (EPA), Region 5, on sampling protocol

7. **Lead service line replacement**

   - Expand the Revolving Loan Fund directed at lead service line replacement
   - Amy Epkey, Maggie Pallone, and Sonya Butler

8. Partner with EPA

- Dan Wyant → Susan Hedman
- Jim Sygo → Bob Kaplan
- Mike Prysby and Steve Busch → Darren Lytle and Mike Schock
- George Krisztian → Tom Burke
- DEQ's Office of Drinking Water and Municipal Assistance (ODWMA) staff → EPA, Region 5, staff (Jennifer Crooks and Tom Poy)

9. Meet with Charles Stewart Mott Foundation to discuss Lead Service Line Identification Study

10. Lead Education Program

- DHHS is the lead on Lead Education Program

11. Moving Karegnondi Water Authority (KWA) forward

- Proactive meetings with KWA

12. Participate actively with Flint Technical Advisory Council

13. Utilize Joan Rose and Michigan State University water expertise

14. Public outreach

- Flint Mayor Karen Weaver
- Genesee County Health Department
- Drs. Lawrence Reynolds, Eden Wells, and Matthew Davis
- Ministers
- Land Bank
- Legislators
- Citizens

15. Outreach to schools

- EPA guidance on testing
- Work with State Superintendent Brian Whiston
- ODWMA staff to work on literature

16. Make recommendations to EPA about Lead and Copper Rule

17. Compliance Communication letter sent on November 9, 2015

- Wait until after December 30, 2015

18. Enhance coordination with health officials regarding personal health notifications of drinking water issues

Krisztian, George (DEQ)

From:	Wurfel, Brad (DEQ)
Sent:	Monday, October 19, 2015 8:36 AM
To:	Wurfel, Sara (GOV); Murray, David (GOV); Agen, Jarrod (GOV); Muchmore, Dennis (GOV); Wyant, Dan (DEQ)
Cc:	Tommasulo, Karen (DEQ); Krisztian, George (DEQ); Sygo, Jim (DEQ); Eisner, Jennifer (DHHS)
Subject:	DRAFT DEQ Statement on leadership change And KEY MESSAGES-- Need review ASAP
Importance:	High

This is going out to media as soon as I've got green light from folks in the "to" line. Everyone else is also welcome to share thoughts as well.
Thanks for fast review.
b

Brad Wurfel
Communications Director
Michigan Department of Environmental Quality
517-284-6713
517-230-8006 cell

DEQ Director Dan Wyant today made the following statement as he announced DEQ Chief Deputy Jim Sygo will immediately assume the role of interim chief of the department's Office of Drinking Water and Municipal Assistance:

"It recently has become clear that our drinking water program staff made a mistake while working with the City of Flint. Simply stated, staff employed a federal protocol they believed was appropriate, and it was not. The water testing steps followed would have been correct for a city less than 50,000 people, but not for a city of nearly 100,000.

As details of the situation emerge, I am convinced our program staff believed they were doing their job right. As the state recognized there could be a health threat to Flint residents, we took appropriate steps. We are now embarked on an unprecedented effort to safeguard Flint residents and families with near-term, intermediate and long-term actions to protect and educate city residents.

The issue in DEQ is experience and protocol with respect to corrosion control. The Governor has called for an independent, third-party after-action review. I have taken the step of changing leadership in the division. We are working with our federal partners and committed to being part of the U.S. EPA's effort to strengthen its Lead and Copper rule.

All who brought this issue to the department deserve credit for bringing it forward. Lead is a serious issue, particularly for young people, and we take it seriously. The Governor's plan incorporates the suggestions outlined by the EPA and researchers at Virginia Tech.

We will learn from this. We will make necessary changes to see to it that our program becomes a national leader in public health protection."

KEY MESSAGES:

1. It is increasingly clear through internal review at DEQ that staff overseeing drinking water mistakenly applied the wrong federal protocol when the city of Flint switched to the Flint River.

2. Today's announcement of new leadership in that division aligns with the states goal: make sure the public health is protected in Flint and elsewhere in the state, and ensure we learn from this so it never happens again.

3. The governor's action plan continues to protect kids and families in Flint, with the switch back to Detroit water last week, free water filtration for all city residents, and inspection of all Flint schools for lead exposure.

4. Flint families who are concerned are encouraged to take advantage of free home water testing through the city and blood lead level testing for children.

Eisenhower Elementary School
Outlet Sampling and Plumbing Assessment
Recommendations

BACKGROUND INFORMATION

On Friday, October 30, 2015, the Department of Licensing and Regulatory Affairs (DLARA) and the Department of Environmental Quality (DEQ) conducted an assessment of Eisenhower Elementary's plumbing system to gain a comprehensive understanding of how water moves through the building and what types of plumbing materials are used. Two outlet buildings in addition to the main school building were included in the assessment. The assessment identified the following potential sources of lead leaching into drinking water:

- Lead solder joints on copper piping
- Brass valves and brass fittings
- Brass components in fixtures
- Galvanized piping

The assessment also identified a total of 43 faucets or fountains that provide water for drinking, cooking and/or food preparation, 37 in the main school building, four in out building unit 1, and two in out building unit 2. The team developed a sequence for sampling the faucets/fountains in each building based on how the water travels through each building.

On Saturday, October 31, 2015, the DEQ and the DLARA completed sampling of the 37 faucets/fountains in the main school building, the four faucets/fountains in out building unit 1, and the two faucets in out building unit 2, each in the order determined by the plumbing assessment from the previous day, following a stagnation period of over 12 hours. At each of the 43 faucets/fountains identified, staff collected four samples. Two initial, 125-milliliter samples (P1 and P2), were collected immediately after turning on the tap. The water was then flushed for 30 seconds and a third, 125-milliliter sample (F1) was collected. Finally, the water was flushed for another two minutes, and the fourth 125-milliliter sample (F2) was collected. These samples were used to determine the impact of any lead sources in and around each specific faucet/fountain and its connecting plumbing.

The DEQ and the DLARA then completed consecutive sampling at three of the 37 faucets/fountains in the main school building, one of the four faucets/fountains in out building unit 1, and one of the two faucets in out building unit 2, five sites in total. This consecutive sampling was used to determine the impact of any lead sources located deep in the supply plumbing at each of these buildings. The three sites in the main school building included one site near the building service line, one site near the plumbing mid-point, and one site at the far end of the plumbing system. At each of these five sites, staff collected 10, 1-liter samples. The 10 samples were collected immediately after turning on the tap, and consecutively, without any flushing time in between.

WATER SERVICE INFORMATION

A four-inch diameter cast iron water service line enters the main school building in the boiler room northwest wall located in the west corner of the building. Piping in the boiler room immediately transitions into galvanized metal piping for cold water lines. Three separate galvanized cold water supply lines exit the boiler room. One in the north corner serves a single hose bib directly outside the boiler room. A second line exits the southeast wall and serves the adjacent janitors closet and dressing room bathrooms. The third line exits the boiler room on the northeast side through a utility tunnel that runs below the school hallways and serves all rooms in the main school building. This supply line then runs between the first and second floors on the southeast end of the building. Copper piping with lead solder joints branches off of the galvanized supply line for cold water supply to each room. Hot water is distributed in continuous loops that feed from and return to a central water heater in the boiler room. Hot water piping material, where exposed, was copper piping with lead solder joints. Brass valves were seen throughout the building.

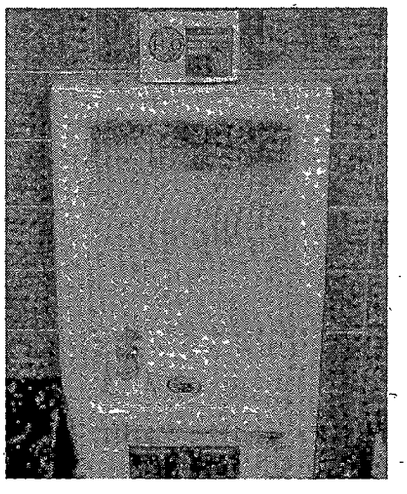
Out building unit 1 has a separate customer service line from the City water main constructed using plastic service line material. The service line comes out of the ground beneath the building and transitions into galvanized piping between the ground and the building. Upon entering the building, the water line transitions from galvanized pipe to copper pipe with "lead-free" solder joints.

Out building unit 2 has a separate customer service line from the City water main constructed using plastic service line material. The service line comes out of the ground beneath the building and transitions into galvanized piping between the ground and the building. Upon entering the building, the water line transitions from galvanized pipe to copper pipe with "lead-free" solder joints.

Outlets With Lead Levels Greater Than 15 Parts per Billion

The DEQ recommends school facilities take action if samples from any drinking water outlets show lead levels greater than 15 parts per billion. Based on the sampling conducted at 43 faucets/fountains on October 31, 2015, the following 18 drinking water outlets had lead water level results greater than 15 parts per billion. Each of these 18 outlets is listed below with its sample results, including a description of the potential source(s) of lead, and recommended actions for the school to take.

Outlet: Bubbler Drinking Fountain, (01DW001)
Location: west corner, Gymnasium Multipurpose Room
Results: P1=32 parts per billion, P2=6 parts per billion,
F1=5 parts per billion, F2=3 parts per billion



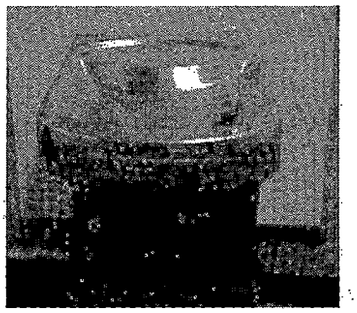
These results suggest the highest contribution of lead may be from the bubbler itself. This bubbler fixture is made of chrome plated brass and is believed to have a brass valve. The connection piping with the unit may also contain some brass components.

Replacement of this bubbler tap and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations

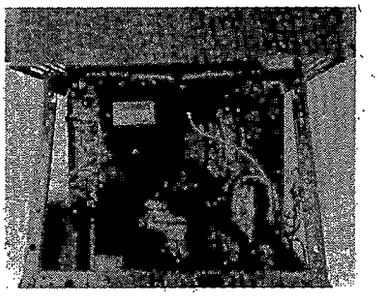
DRAFT

and lead exposure.

Outlet: Water Cooler Fountain (01WC002)
Location: Hallway between Gym and Auditorium, northeast side
Results: P1=17 parts per billion, P2=17 parts per billion,
F1=12 parts per billion, F2=3 parts per billion

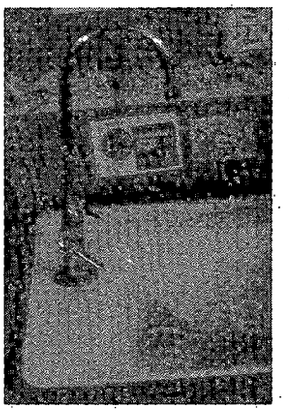


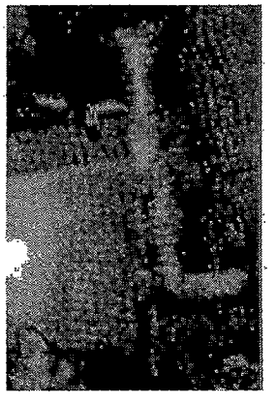
These results suggest the highest contribution of lead may be from the water cooler unit. The water cooler is an Elkay model LKEZFS8. This model contains some brass components. Connecting plumbing to the cooler unit may also contain brass components.



Replacement of any brass components in the cooler with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

Outlet: Sink Faucet (01CF004)
Location: Classroom 109, northwest wall
Results: P1=17 parts per billion, P2=10 parts per billion,
F1=1 part per billion, F2=2 parts per billion



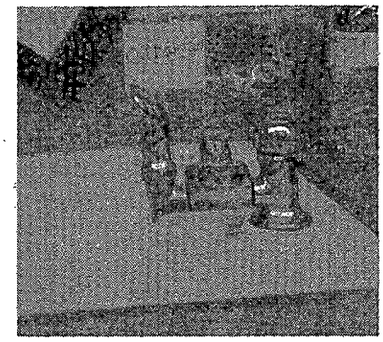


These results suggest the highest contribution of lead may be from the faucet and its connecting plumbing. The base of this faucet is chrome plated brass, and has a brass connection on the underside of the sink. Hot and cold water lines connect to this faucet with a brass mixer fitting under the sink. Connecting plumbing in the cabinet under the sink may also contain additional brass components.

This faucet also has an aerator/screen at the outlet. The aerator/screen should be removed, inspected for particulate accumulations, scrubbed clean, and reinstalled. If particulates are found the aerator/screen should be periodically checked and cleaned.

Replacement of this faucet and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

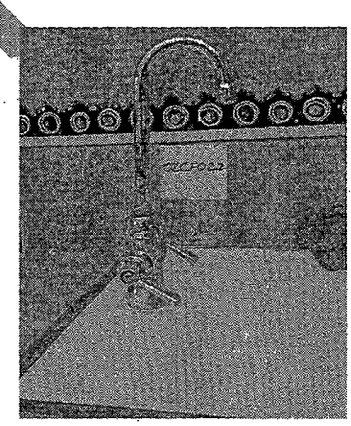
Outlet: Bubbler Fountain (02DW020)
Location: Classroom 201, southeast wall
Results: P1=37 parts per billion, P2=24 parts per billion,
F1=2 parts per billion, F2=non-detect



These results suggest the highest contribution of lead may be from the bubbler and its connecting plumbing. This bubbler fixture is made of chrome plated brass and has a brass connector on the underside of the sink. The bubbler also has a chrome plated brass flow regulator installed between the operating valve and the outlet. The connecting plumbing is copper with lead solder and includes a brass shut off valve.

Replacement of this bubbler tap and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

Outlet: Sink Faucet (02CF022)
Location: Classroom 202, northwest wall
Results: P1=7 parts per billion, P2=24 parts per billion,
F1=2 parts per billion, F2=1 part per billion



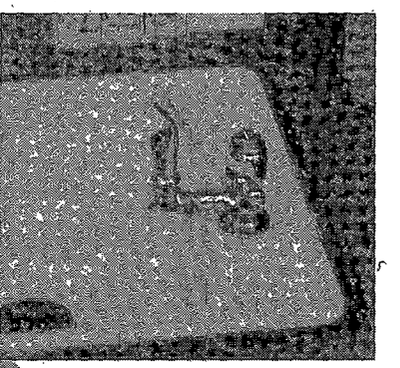
These results suggest the highest contribution of lead may be from the faucet and its connecting plumbing. The base of this faucet is chrome plated brass, and has a brass connection on the underside of the sink. Connecting plumbing in the cabinet under the sink is made up of brass connectors, copper piping with lead solder, and brass shut off valves.

This faucet also appears to have an aerator/screen at the outlet. The aerator/screen should be removed, inspected for particulate accumulations, scrubbed clean, and reinstalled. If particulates are found the aerator/screen should be periodically checked and cleaned.

Replacement of this faucet and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

DRAFT

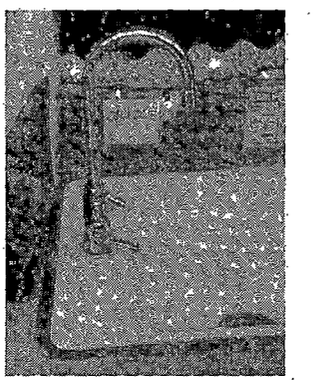
Outlet: Bubbler Fountain (01DW013)
Location: Classroom 104, southwest wall
Results: P1=43 parts per billion, P2=106 parts per billion,
F1=3 parts per billion, F2=2 parts per billion



These results suggest the highest contribution of lead may be from the bubbler and its connecting plumbing. This bubbler fixture and is made of chrome plated brass and has a brass connector on the underside of the sink. Connecting plumbing in the cabinet under the sink is made up of brass connectors, copper piping with lead solder, and a brass shut off valve.

Replacement of this bubbler tap and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

Outlet: Sink Faucet (01CF014)
Location: Classroom 104, southwest wall
Results: P1=36 parts per billion, P2=36 parts per billion,
F1=2 parts per billion, F2=1 part per billion

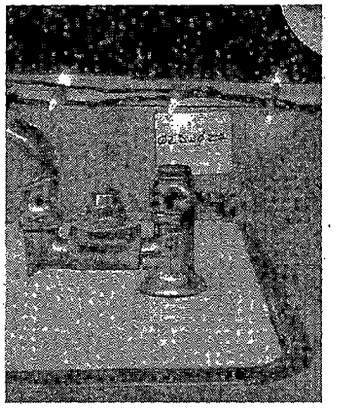


These results suggest the highest contribution of lead may be from the faucet and its connecting plumbing. The base of this faucet is chrome plated brass, and has a brass connection on the underside of the sink. Connecting plumbing in the cabinet under the sink is made up of brass connectors, copper piping with lead solder, and brass shut off valves.

This faucet also appears to have an aerator/screen at the outlet. The aerator/screen should be removed, inspected for particulate accumulations, scrubbed clean, and reinstalled. If particulates are found the aerator/screen should be periodically checked and cleaned.

Replacement of this faucet and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

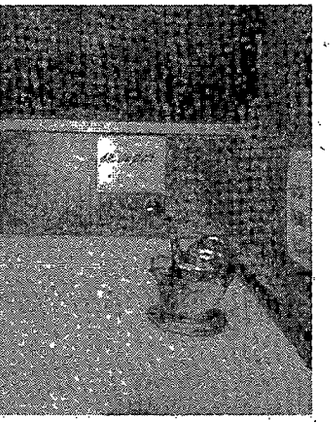
Outlet: Bubbler Fountain (02DW027)
Location: Classroom 204, southwest wall
Results: P1=18 parts per billion, P2=8 parts per billion,
F1=2 parts per billion, F2=1 part per billion



These results suggest the highest contribution of lead may be from the bubbler and its connecting plumbing. This bubbler fixture is made of chrome plated brass and has a brass connector on the underside of the sink. The bubbler also has a chrome plated brass flow regulator installed between the operating valve and the outlet. The connecting plumbing is copper with lead solder and includes a brass shut off valve.

Replacement of this bubbler tap and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

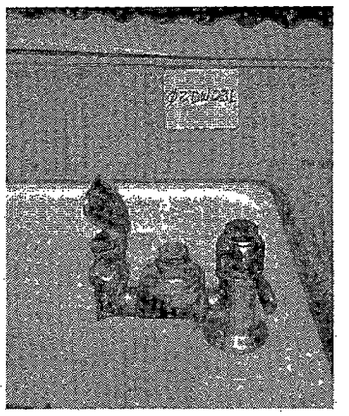
Outlet: Bubbler Fountain (02DW029)
Location: Classroom 205, northeast wall
Results: P1=39 parts per billion, P2=14 parts per billion,
F1=11 parts per billion, F2=1 part per billion



These results suggest the highest contribution of lead may be from the bubbler and its connecting plumbing. This bubbler fixture is made of chrome plated brass and has a brass connector on the underside of the sink. Connecting plumbing in the cabinet under the sink is made up of brass connectors and copper piping with lead solder.

Replacement of this bubbler tap and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

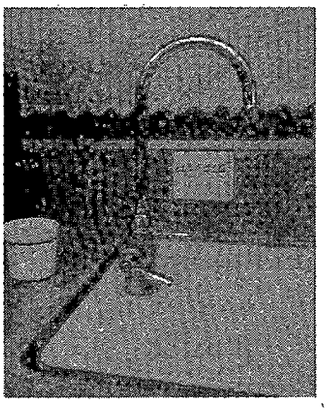
Outlet: Bubbler Fountain (02DW031)
Location: Classroom 206, southwest wall
Results: P1=84 parts per billion, P2=7 parts per billion,
F1=1 part per billion, F2=non-detect



These results suggest the highest contribution of lead may be from the bubbler and its connecting plumbing. This bubbler fixture is made of chrome plated brass and has a brass connector on the underside of the sink. The bubbler also has a chrome plated brass flow regulator installed between the operating valve and the outlet. Connecting plumbing in the cabinet under the sink should be checked for brass components and copper piping with lead solder.

Replacement of this bubbler tap and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

Outlet: Sink Faucet (01CF016)
Location: Classroom 106, northeast wall
Results: P1=402 parts per billion, P2=61 parts per billion,
F1=4 parts per billion, F2=1 part per billion



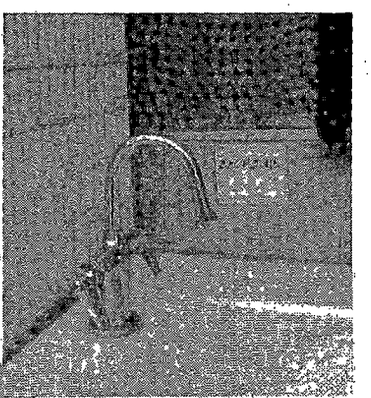
These results suggest the highest contribution of lead may be from the faucet and its connecting plumbing. The base of this faucet is chrome plated brass, and has a brass connection on the underside of the sink. Connecting plumbing in the cabinet under the sink is partly made up of brass connectors, copper piping with lead solder, and brass shut off valves.

This faucet also appears to have an aerator/screen at the outlet. The aerator/screen should be removed, inspected for particulate accumulations, scrubbed clean, and reinstalled. If particulates are found the aerator/screen should be periodically checked and cleaned.

Replacement of this faucet and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

DRAFT

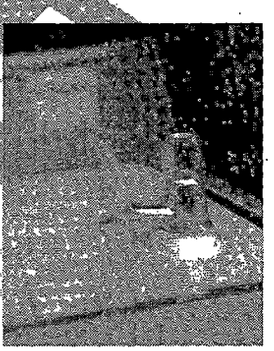
Outlet: Sink Faucet (02CF032)
Location: Classroom 207, northeast wall
Results: P1=21 parts per billion, P2=23 parts per billion,
F1=5 parts per billion, F2=1 part per billion

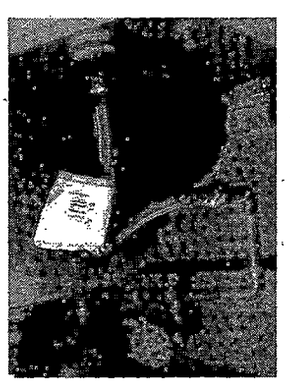


These results suggest the highest contribution of lead may be from the faucet and its connecting plumbing. The base of this faucet is chrome plated brass, and has a brass connection on the underside of the sink. Connecting plumbing in the cabinet under the sink is partly made up of brass connectors, copper piping with lead solder, and brass shut off valves.

Replacement of this faucet and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

Outlet: Bubbler Fountain (02DW033)
Location: Classroom 207, northeast wall
Results: P1=17 parts per billion, P2=5 parts per billion,
F1=4 parts per billion, F2=1 part per billion

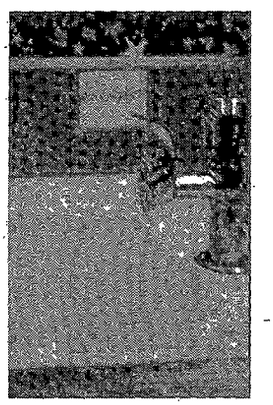




These results suggest the highest contribution of lead may be from the bubbler and its connecting plumbing. Parts of this bubbler fixture are made of brass and it has a brass connector on the underside of the sink. Connecting plumbing in the cabinet under the sink is partly made up of brass connectors, copper piping with lead solder, and a brass shut off valve.

Replacement of this bubbler tap and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

Outlet: Bubbler Fountain (02DW035)
Location: Classroom 208, southwest wall
Results: P1=12 parts per billion, P2=19 parts per billion,
F1=6 parts per billion, F2=3 parts per billion



These results suggest the highest contribution of lead may be from the bubbler and its connecting plumbing. This bubbler fixture is made of chrome plated brass and has a brass connector on the underside of the sink. Connecting plumbing in the cabinet under the sink should be checked for brass components and copper piping with lead solder.

Replacement of this bubbler tap and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

Outlet: Sink Faucet (02CF034)
Location: Classroom 208, southwest wall
Results: P1=19 parts per billion, P2=12 parts per billion,
F1=3 parts per billion, F2=2 parts per billion

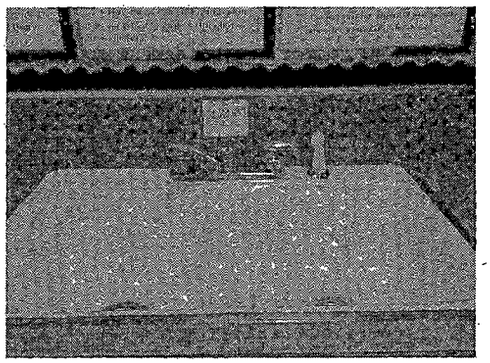
No Image Available

These results suggest the highest contribution of lead may be from the faucet and its connecting plumbing. The base of this faucet is chrome plated brass, and has a brass connection on the underside of the sink. Connecting plumbing in the cabinet under the sink should be checked for brass components and copper piping with lead solder.

Replacement of this faucet and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

DRAFT

Outlet: Kitchen Faucet (01KC019)
Location: Room 108, southwest wall
Results: P1=17 parts per billion, P2=5 parts per billion,
F1=4 parts per billion, F2=1 part per billion



These results suggest the highest contribution of lead may be from the faucet and its connecting plumbing. This fixture appears to be a Delta two-handled faucet. This model faucet typically has a brass tube in its deck body and may contain some additional brass components. Connecting plumbing in the cabinet under the sink should be checked for brass components and copper piping with lead solder.

This faucet also has an aerator at the outlet. The aerator should be removed, inspected for particulate accumulations, scrubbed clean, and reinstalled. If particulates are found, the aerator should be periodically checked and cleaned.

Replacement of this faucet and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

Outlet: Sink Faucet (02CF036)
Location: Classroom 209, southwest wall
Results: P1=7 parts per billion, P2=21 parts per billion,
F1=5 parts per billion, F2=1 part per billion

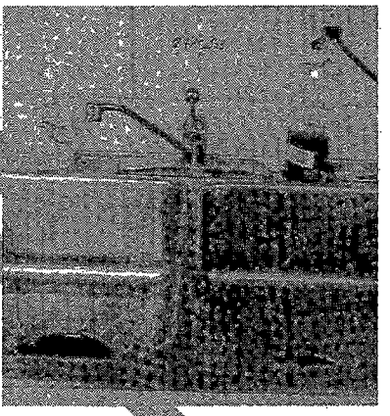


These results suggest the highest contribution of lead may be from the faucet and its connecting plumbing. The base of this faucet is chrome plated brass, and has a brass connection on the underside of the sink. Hot and cold water lines connect to this faucet with a brass mixer fitting under the sink. Connecting plumbing in the cabinet under the sink may also contain additional brass connectors and copper plumbing with lead solder.

This faucet also has an aerator/screen at the outlet. The aerator/screen should be removed, inspected for particulate accumulations, scrubbed clean, and reinstalled. If particulates are found the aerator/screen should be periodically checked and cleaned.

Replacement of this faucet and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

Outlet: Kitchen Faucet, Left (04KC043)
Location: Outbuilding Unit 2 DHHS Office
Results: P1=17 parts per billion, P2=3 parts per billion,
F1=2 parts per billion, F2=3 parts per billion



These results suggest the highest contribution of lead may be from the faucet and its connecting plumbing. The faucet is a Delta 400. This model faucet valve has brass components. This style faucet also has a mixing valve that may allow mixing of hot and cold water. Connecting plumbing in the cabinet under the sink may also contain brass components.

This faucet also has an aerator at the outlet. The aerator should be removed, inspected for particulate accumulations, scrubbed clean, and reinstalled. If particulates are found, the aerator should be periodically checked and cleaned.

Replacement of this faucet and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

Outlets With Lead Levels 15 Parts per Billion or Less

While the remaining 25 outlets showed sample results to be at levels requiring no further action, several recommendations have been identified.

The fourth sample (F2) at all 43 outlets following approximately 3 minutes of use and flushing at a reduced flow resulted in reduced lead concentrations of 3 parts per billion or less. This indicates that flushing of all taps used for drinking, cooking, and/or food preparation for 4 minutes following periods of stagnation will further reduce lead exposure. It is recommended that a flushing operational procedure be developed for use by staff responsible for plumbing operations and maintenance.

17 of these 25 outlets are comprised of similar materials as the outlets listed above and could potentially experience higher lead levels under extended periods of stagnation. These faucets/fountains include:

- Sink Side Bubbler Units in Classroom 109 (01DW003), Classroom 101 (01DW007), Classroom 102 (01DW009), Classroom 202 (02DW023), Classroom 103 (01DW011), Classroom 203 (02DW025), Classroom 106 (01DW015), Classroom 107 (01DW017), and Classroom 209 (02DW037)

- Chrome Plated Brass Base Faucets in Classroom 101 (01CF008), Classroom 201 (02CF021), Classroom 103 (01CF012), Classroom 203 (02CF024), Classroom 204 (02CF026), Classroom 205 (02CF028), and Classroom 107 (01CF018)

- Delta 400 Model Faucet in Out Building Unit 2 (04KC044)

Replacement of these fixtures with lead-free materials is also recommended.

The remaining eight outlets showed sample results of 15 parts per billion or less, requiring no further action or additional recommendations. These faucets/fountains include:

- Sink Faucets in Classroom 102 (01CF010) and the Clinic (01CF006)
- Kitchen Faucets in the Community Room Kitchen (01KC005), Classroom 206 (02CF030), Out Building Unit 1 (03KC040 and 03KC041)
- Water Coolers in Out Building Unit 1 (03DW038 and 03DW039)

Consecutive Sampling Results and Building Plumbing Recommendations

The consecutive samples taken on October 31, 2015, at three sites in the main school building and one site from each of the two out building units all provide additional confirmation that the highest contribution of lead appears to be from the individual faucet/fountains and not from the larger diameter supply plumbing within the main school building or the two out building units. Results of the consecutive sample monitoring are listed in the table below.

Consecutive Sample No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Location	Lead Result (parts per billion; ND = not-detected)									
Classroom 109 Sink Faucet (01CF004)	3	ND	ND	ND	ND	ND	ND	ND	ND	ND
Classroom 102 Sink Faucet (01CF010)	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
Classroom 209 Sink Faucet (02CF036)	3	1	1	1	ND	ND	ND	ND	ND	ND
Out Building Unit 1 Kitchen Faucet (03KC040)	1	ND	ND	ND	ND	ND	ND	ND	ND	ND
Out Building Unit 2 Kitchen Faucet (04KC044)	2	ND	ND	ND	ND	ND	1	1	ND	ND

Thelen, Mary Beth (DEQ)

From: Shaler, Karen (DEQ)
Sent: Thursday, October 15, 2015 1:58 PM
To: Sygo, Jim (DEQ); McDonald, Paul (DEQ); Krisztian, George (DEQ)
Cc: Thelen, Mary Beth (DEQ)
Subject: Who will participate in call? - RE: Contract for Water

Importance: High

I just received a call from Randy Byrne, Treasury, who said Wayne Workman asked him to call us about scheduling this conference call. I can work on scheduling it but need to know who from DEQ needs to participate. In addition, Randy doesn't know who from Mott needs to participate and wondered if Jim knows. Randy said Wayne would participate from Treasury and he assumed Mayor Walling and Natasha Henderson would participate from city of Flint (but I'll find that out when I contact Flint).

I told Randy I'd call him about the DEQ and Mott participants. Randy's phone number is 335-2521. Thanks.

From: Sygo, Jim (DEQ)
Sent: Thursday, October 15, 2015 1:01 PM
To: McDonald, Paul (DEQ)
Cc: Krisztian, George (DEQ); Thelen, Mary Beth (DEQ); Shaler, Karen (DEQ)
Subject: FW: Contract for Water

Paul,
FYI, we will need t establish a process for the disbursement of the money to Flint.

From: Workman, Wayne (TREASURY)
Sent: Thursday, October 15, 2015 11:31 AM
To: Dayne Walling; Muchmore, Dennis (GOV)
Cc: Natasha Henderson; Sygo, Jim (DEQ); Wyant, Dan (DEQ); Saxton, Thomas (Treasury); Byrne, Randall (Treasury)
Subject: RE: Contract for Water

Mayor, The state appropriation is being made to the DEQ. I have copied Director Wyant and his Chief Deputy Jim Sygo on this. We recommend a conference call with DEQ, Mott and the City to agree on payment procedures. It will be necessary to have a list of expenditure amounts for water and any other equipment, services and supplies that will total up to the $12,000,000 budget. Treasury will participate and help any way, but it is important DEQ , Mott and the City agree on the process. We can participate in a call today or Friday. Wayne

From: Dayne Walling [mailto:dwalling@cityofflint.com]
Sent: Thursday, October 15, 2015 11:02 AM
To: Muchmore, Dennis (GOV) <muchmored@michigan.gov>; Workman, Wayne (TREASURY) <WorkmanW@michigan.gov>
Cc: Natasha Henderson <nhenderson@cityofflint.com>
Subject: Contract for Water

Gentlemen, I have asked City Administrator Natasha Henderson to reach out to you at Treasury Wayne about the contract for Detoit water. The Mott Foundation has questions about payments and ensuring all parties are

contributing to the monthly costs as well as how an escrow fund would work to ensure funds are solely for this purpose. Time is of the essence as you know and the City is prepared to do all things necessary for the water to begin flowing as quickly as possible as we have agreed. Thanks for your tremendous efforts on this and we look forward to finalizing the agreements hopefully today or tomorrow.

--

Dayne Walling
Mayor, City of Flint
City Hall, 1101 S. Saginaw St.
Flint, MI 48502
810-766-7346
mayor@cityofflint.com
www.cityofflint.com
follow me on twitter at http://twitter.com/mayorwalling

Thelen, Mary Beth (DEQ)

From:	The Office of Senator Ananich <SenJAnanich@senate.michigan.gov>
Sent:	Wednesday, October 21, 2015 12:43 PM
To:	hedman.susan@epa.gov; mccarthy.gina@epa.gov
Cc:	Jordan.Dickinson@mail.house.gov; mayor@cityofflint.com; HCroft@cityofflint.com; poy.thomas@epa.gov; Schock.michael@epa.gov; Lytle.darren@epa.gov; fortin.denise@epa.gov; Wyant, Dan (DEQ); aaron_suntag@stabenow.senate.gov; Bentley_Johnson@peters.senate.gov; Davis.CatherineM@epa.gov; repphelps@house.mi.gov; SheldonNeeley@house.mi.gov; PPI
Subject:	Letter Requesting EPA Review of Flint, MI Water
Attachments:	2015.10.21 EPA Review Request FINAL.PDF

Administrator McCarthy and Regional Director Hedman,

Please see the attached letter regarding a request for an EPA review of Flint, Michigan's water treatment.

Please do not hesitate to contact my office if you have any questions. Thank you for your time and attention.

Sincerely,

The Office of State Senator Jim Ananich
Michigan Senate Minority Leader
District 27

cc: Sue
George K.
Lisa Shelba
Steve Busch
Maggie Ribbie
Brad Wurfel

Director asked that I provide you a copy.
mlt 10-23

Orig: Dan

SENATE MINORITY LEADER
JIM ANANICH

517.373.0412
senjananich@senate.michigan.gov
senatedems.com/ananich

/jimananich @jimananich

October 21, 2015

Gina McCarthy
Administrator
United States Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Mail Code 6106A
Washington, DC 20460

Susan Hedman
Regional Administrator
United States Environmental Protection Agency Region 5
Ralph Metcalfe Federal Building
77 West Jackson Boulevard
Chicago, IL 60604

Re: EPA Review Needed on Flint, Michigan Water Treatment

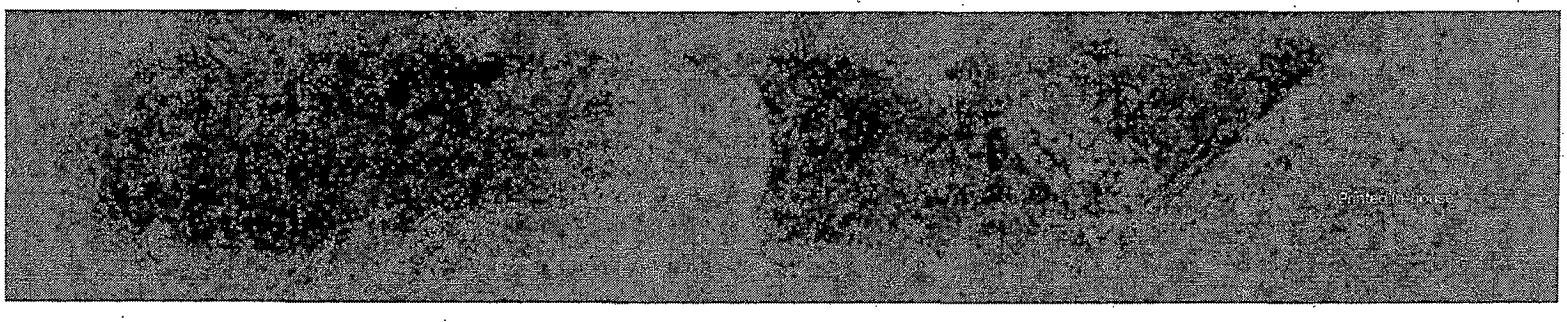
Administrator McCarthy and Regional Director Hedman,

Today Congressman Dan Kildee requested that the United States Environmental Protection Agency conduct an investigation into the water system in Flint, Michigan. I agree that such an investigation is vital to ensuring that the people responsible for Flint's dangerous water quality are held accountable. Similar to Congressman Kildee's request, I am requesting the EPA conduct a review of the Michigan Department of Environmental Quality's (MDEQ) oversight of water treatment in Flint as provided for in the Lead and Copper Rule, 40 CFR Sec. 141.80.

After decades of relying on water from the Detroit Water and Sewerage Department (DWSD), Flint began treating its own water from the Flint River in April 2014 at the behest of state-appointed Emergency Managers. DWSD had used — and continues to use — anti-corrosion treatments in its water to prevent lead leaching from an aging infrastructure into residents' drinking water. For a number of reasons, raw water from the Flint River is significantly more corrosive than the lake water that DWSD uses. Despite this, Flint chose not to treat the raw Flint River water by any method traditionally associated with preventing lead corrosion. Multiple consultants and the EPA advised the city to use additional corrosion control measures, but that advice went unheeded by the City of Flint and the MDEQ.

Foreseeably, lead has been seeping into Flint's drinking water for more than a year, causing an alarming rise in the number of children in Flint with elevated blood lead levels. Independent research conducted by Virginia Tech professor Marc Edwards indicated high lead levels in tap water, and a study led by Hurley Medical Center pediatrician Dr. Mona Hanna-Attisha revealed that in high-risk areas of the city, the rate of lead overexposure among children more than doubled since switching water sources. State data have confirmed these results.

Additionally, several questions remain regarding how Flint and state officials conducted water sampling under the Lead and Copper Rule. Allegedly, officials did not target samples in high-risk Tier 1 locations or repeat locations in subsequent tests. Consumers were also instructed to pre-flush their taps prior to collecting samples, resulting in lower lead level results. It is unclear whether a sufficient number of samples were taken or why MDEQ excluded two high lead level samples from Flint's July 2015 water quality report.



SENATE MINORITY LEADER
JIM ANANICH

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senjananich@senate.michigan.gov
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/jimananich @jimananich

The State of Michigan has pledged to help reconnect the City of Flint to DWSD and take additional steps to help remediate the lead problem. However, these are stopgap measures that will never undo the damage already done.

Ultimately, the EPA retains the ability and responsibility to oversee the state's efforts to obtain and maintain safe drinking water for its residents. As such, I appreciate that the EPA has established the Flint Safe Drinking Water Task Force. However, it also is within the EPA's power to review the actions of MDEQ and the City of Flint as they pertain to lead testing and treatment under the Lead and Copper Rule. We want to ensure Flint remains compliant once it switches its permanent water source to the Karegnondi Water Authority.

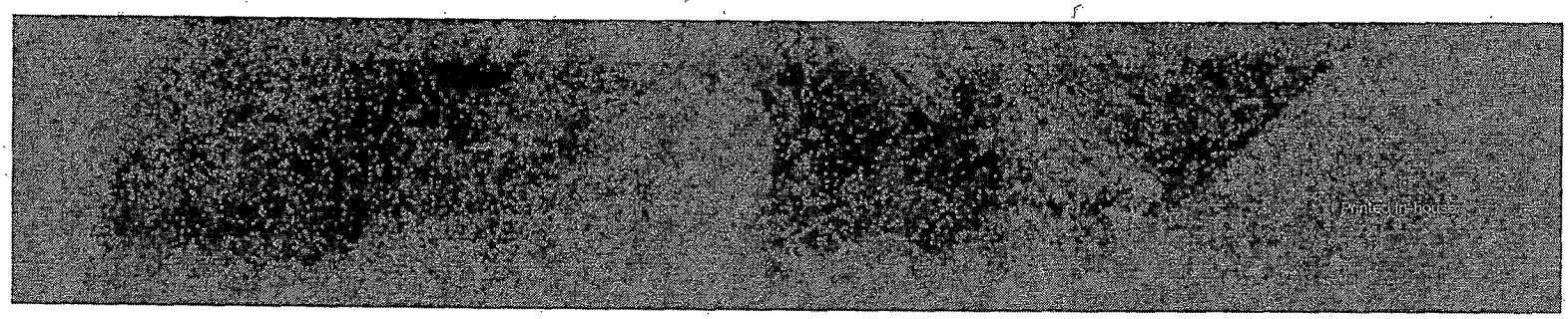
I respectfully request that, under 40 CFR Sec. 142.19, Regional Administrator Hedman review MDEQ's determinations regarding corrosion control for lead in Flint, Michigan. Regardless of the findings, I am also requesting that Regional Administrator Hedman make public all evidence gathered during the course of that review. Michigan citizens deserve to know whether MDEQ is operating safely and effectively.

If you have any questions, please contact my office at senjananich@senate.mi.gov or (517) 373-0142. Thank you for your consideration.

Sincerely,

Jim Ananich
Senate Democratic Leader
District 27

cc:
Governor Rick Snyder
U.S. Representative Dan Kildee
U.S. Senator Debbie Stabenow
U.S. Senator Gary Peters
State Representative Sheldon Neeley, District 34
State Representative Phil Phelps, District 49
Mayor Dayne Walling, City of Flint
Howard Croft, City of Flint
Susan Hedman, EPA
Thomas Poy, EPA
Michael Schock, EPA-ORD
Darren Lytle, EPA-ORD
Denise Fortin, EPA
Dan Wyant, MDEQ
Liane Shekter-Smith, MDEQ
Pat Cook, MDEQ
Stephen Busch, MDEQ
Brad Wurfel, MDEQ
Marc Edwards, Virginia Tech



Thelen, Mary Beth (DEQ)

From: Baird, Richard (GOV)
Sent: Friday, January 22, 2016 7:52 AM
To: Creagh, Keith (DEQ)
Cc: Agen, Jarrod (GOV)
Subject: Fwd: Recommendations Regarding Flint Water System and Legionella
Attachments: FWATF - Snyder Ltr 3_updated.docx; ATT00001.htm

Keith,

Could you or George K take the lead in drafting a response from the Governor? You have already reached out to EPA on point 1. I would suggest a call with TF member Eric Rothstein would be useful dealing with 3rd party outreach. Let me know if I can arrange that.

Be good to get back to TF by close of business today. Thank you.

Best,

Rich

Sent from my Verizon Wireless 4G LTE DROID
---------- Forwarded message ----------
From: "Snyder, Rick (GOV)" <PPI
Date: Jan 22, 2016 7:31 AM
Subject: Fwd: Recommendations Regarding Flint Water System and Legionella
To: "Agen, Jarrod (GOV)" <AgenJ@michigan.gov>,"Baird, Richard (GOV)" <bairdr@michigan.gov>,"Creagh, Keith (DEQ)" <creaghk@michigan.gov>,"Lyon, Nick (DHHS)" <LyonN2@michigan.gov>
Cc: "Scott, Allison (GOV)" <scotta12@michigan.gov>

I just received this email. Please promptly review it and its recommendations. Let's respond promptly.

Thanks
Rick

Sent from my iPad

Begin forwarded message:

> **From:** Ken Sikkema <ksikkema@pscinc.com>
> **Date:** January 22, 2016 at 7:20:20 AM EST
> **To:** <snyderr11@michigan.gov>
> **Cc:** "Baird, Richard (GOV)" <bairdr@michigan.gov>, Chris Kolb <chris@environmentalcouncil.org>, Matt Davis <mattdav@med.umich.edu>, Lawrence Reynolds <reynolds@mottchc.org>, Eric Rothstein <erothste@grg-ltd.com>, Chris DeWitt <chris@dewitt-communications.com>
> **Subject: Recommendations Regarding Flint Water System and Legionella**

Krisztian, George (DEQ)

From: DEQ-Legislative-Contact
Sent: Tuesday, November 17, 2015 8:24 AM
To: Krisztian, George (DEQ)
Subject: RE: ODWMA/LEG00237/Phelps/FOIA

I believe we are going to the Nov 5th when he sent the email???? I don't know a lot about this though. Sorry.

From: Krisztian, George (DEQ)
Sent: Tuesday, November 17, 2015 5:37 AM
To: DEQ-Legislative-Contact
Subject: Re: ODWMA/LEG00237/Phelps/FOIA

The start date is January 1, 2011 is the end date the date of the original FOIA? If so what is that date?

Sent from my iPhone

On Nov 16, 2015, at 11:44 AM, DEQ-Legislative-Contact <DEQ-Legislative-Contact@michigan.gov> wrote:

> After further review we believe this should also go to the whole Executive Office. Please start reviewing your files for any responsive records you may have. We would like to have you respond to DEQ-Legislative-Contact@michigan.gov by this Friday, Nov 16.
>
> When Maggie gets back we will talk to her again about this, but she will not be back until Friday and we are trying to be proactive on our response.
>
> If you have any questions let me know!
>
> Thanks!
> Heather Feuerstein
> Management Assistant to
> Maggie Pallone, Deputy Director and
> Brad Wurfel, Communications Director
> Department of Environmental Quality
> 517.284.6715

From: Pallone, Maggie (DEQ)
Sent: Thursday, November 05, 2015 4:50 PM
To: DEQ-Legislative-Contact

Cok -

Krisztian, George (DEQ)

From: Benzie, Richard (DEQ)
Sent: Saturday, May 02, 2015 10:35 AM
To: Shekter Smith, Liane (DEQ)
Subject: Fw: Flint Corrosion Control?

FYI

From: Cook, Pat (DEQ)
Sent: Friday, May 1, 2015 11:38 AM
To: Deltoral, Miguel
Cc: Porter, Andrea; Crooks, Jennifer; Poy, Thomas; Benzie, Richard (DEQ); Busch, Stephen (DEQ)
Subject: RE: Flint Corrosion Control?

Hi Miguel - sorry, I should have been more specific in my previous email. The rules you stated below allow large systems to be considered having optimal corrosion control if they have data from two consecutive 6 month monitoring periods that meet specific criteria. DEQ-ODWMA has not made a formal decision as to whether or not the City of Flint meets the exemption criteria or will be required to do a corrosion control study since Flint has only completed one round of 6 month monitoring. The City of Flint's second round of monitoring will be completed by June 30, 2015, and we will make a formal decision at that time. If my memory is correct, this is consistent with the process followed in the early 1990's for large systems when the Pb/Cu rule was first implemented. The Department waits until large systems complete both rounds of full scale, 6 month monitoring before making a decision about optimal corrosion control. If it is determined that Flint has to install corrosion control treatment, the rule allows up to 2 years to complete a study and 2 additional years to install the treatment unless we set a shorter time frame.

As Flint will be switching raw water sources in a just over one year from now, raw water quality will be completely different than what they currently use. Requiring a study at the current time will be of little to no value in the long term control of these chronic contaminants.

Finally, the City of Flint's sampling protocols for lead and copper monitoring comply will all current state and federal requirements. Any required modifications will be implemented at the time when such future regulatory requirements take effect.

Patrick Cook, P.E.
Community Drinking Water Unit
Office of Drinking Water & Municipal Assistance
Michigan Department of Environmental Quality
Phone: (517) 284-6514
cookp@michigan.gov

From: Deltoral, Miguel [mailto:deltoral.miguel@epa.gov]
Sent: Saturday, April 25, 2015 10:11 AM
To: Cook, Pat (DEQ)
Cc: Porter, Andrea; Crooks, Jennifer; Poy, Thomas
Subject: Re: Flint Corrosion Control?

Hi Pat,

I'll be heading out to MI for RTCR tomorrow and won't see email until next Tuesday, but I wanted to follow up on this because Flint has essentially not been using any corrosion control treatment since April 30, 2014 and they have LSLs. Given the very high lead levels found at one home and the pre-flushing happening at Flint, I'm worried that the whole town may have much higher lead levels than the compliance results indicated, since they are using pre-flushing ahead of their compliance sampling.

If the source water lead is non-detect (zero), then according to 141.89(a)(3) they should use zero for that source water value:

"All lead and copper levels measured between the PQL and MDL must be either reported as measured or they can be reported as one-half the PQL specified for lead and copper in paragraph (a)(1)(ii) of this section. All levels below the lead and copper MDLs must be reported as zero."

As far as the treatment determination, there are only two scenarios for a large system to be deemed to have optimized corrosion control without treatment and Flint does not appear to meet either:

The first is at 141.81(b)(3)

Any water system is deemed to have optimized corrosion control if it submits results of tap water monitoring conducted in accordance with § 141.86 and source water monitoring conducted in accordance with § 141.88 that demonstrates for two consecutive 6-month monitoring periods that the difference between the 90th percentile tap water lead level computed under §141.80(c)(3), and the highest source water lead concentration is less than the Practical Quantitation Level for lead specified in § 141.89(a)(1)(ii).

If Flint's highest source water lead was zero, and their 90th percentile was 0.006, then Flint does not meet this criteria, because the difference must be LESS THAN the PQL (i.e., 0.004 or less). 0.006 - 0 = 0.006.

The second is at 141.81(b)(3)(i):
Those systems whose highest source water lead level is below the Method Detection Limit may also be deemed to have optimized corrosion control under this paragraph if the 90th percentile tap water lead level is less than or equal to the Practical Quantitation Level for lead for two consecutive 6-month monitoring periods.

Although Flint's source water lead was non-detect (zero), the 90th percentile lead level is 0.006 which is above the PQL of 0.005, so Flint would not meet this criteria either.

Am I missing something?

Miguel A. Del Toral
Regulations Manager
U.S. EPA R5 GWDWB
77 West Jackson Blvd, (WG-15J)
Chicago, IL 60604
Phone: (312) 886-5253

From: Cook, Pat (DEQ) <COOKP@michigan.gov>
Sent: Friday, April 24, 2015 12:45 PM
To: Deltoral, Miguel
Subject: RE: Flint Corrosion Control?

Total Lead collected from the plant tap on 5/22/14 was zero.

pat

From: Deltoral, Miguel [mailto:deltoral.miguel@epa.gov]
Sent: Friday, April 24, 2015 11:59 AM
To: Cook, Pat (DEQ)
Cc: Poy, Thomas; Porter, Andrea
Subject: Re: Flint Corrosion Control?

What was the source water lead level?

Miguel A. Del Toral
Regulations Manager
U.S. EPA R5 GWDWB
77 West Jackson Blvd, (WG-15J)
Chicago, IL 60604
Phone: (312) 886-5253

From: Cook, Pat (DEQ) <COOKP@michigan.gov>
Sent: Friday, April 24, 2015 10:43 AM
To: Deltoral, Miguel
Cc: Poy, Thomas; Porter, Andrea
Subject: RE: Flint Corrosion Control?

- STEVE 2/27/15 SITES YES

Hi Miguel - Flint is currently not practicing corrosion control treatment at the WTP. When they started treating water at their WTP last spring, we placed them on full chart (100 sites) Pb/Cu monitoring for two consecutive 6 month periods. WQ monitoring is also being conducted. The first round of samples after switch-over from DWSD (July 1, 2014 – Dec 31, 2014) had 90th percentiles of 6 ppb for Lead and 110 ppb for Copper. The second round of samples (Jan 1, 2015 – June 30, 2015) is underway with approximately 20 of the 100 sample site results in. The highest lead result out of the 20 received thus far is 13 ppb. ↑ JULY 24TH NOTE EXPLAINING WHY GO NEEDED

Based on the matrix of recommended corrosion control study components for Large PWS's for both Lead and Copper, there are no additional requirements for the City of Flint based on the levels of lead and copper in the current source water and the results of the lead and copper distribution monitoring. The only provision of the Lead & Copper Rule which classifies the existing treatment of large PWSs as optimized for corrosion control is when the difference between the 90% Pb-TAP and Pb-POE is less than the lead practical quantitative level (PQL) for each six-month period of the initial monitoring program. By definition, the PQL for lead is 0.005 mg/L; and the lead value for the source water used in this determination is the highest source water lead concentration. If this condition is met, then no study or testing is required. We believe this condition has been met for Flint. However, we will re-evaluate this after the 2nd round of 6 month sampling is completed.

EXPLANATION NEEDED FOR MY UNDERSTANDING

If you have any further questions, please contact the Lansing District Supervisor, Steve Busch at (517) 643-2314 or at buschs@michigan.gov.

Have a good (and hopefully warm) weekend!

Patrick Cook, P.E.
Community Drinking Water Unit
Office of Drinking Water & Municipal Assistance
Michigan Department of Environmental Quality
Phone: (517) 284-6514
cookp@michigan.gov

From: Deltoral, Miguel [mailto:deltoral.miguel@epa.gov]
Sent: Thursday, April 23, 2015 12:33 PM
To: Cook, Pat (DEQ)
Cc: Poy, Thomas; Porter, Andrea
Subject: Flint Corrosion Control?

Hi Pat.

What's Flint doing now (post Detroit) for corrosion control treatment?

Miguel A. Del Toral
Regulations Manager
Ground Water and Drinking Water Branch
77 West Jackson Blvd (WG-15J)
Chicago, IL 60604
Phone: (312) 886-5253

ANALYTE	RESULT (mg\L)	Sample Location	Sample Description	Site Code	Site Code Description
Lead	0.010	Classroom 12	CF022	P1	First Primary draw of 125 milliliters
Lead	0.003	Classroom 12	CF022	P2	Second Primary draw of 125 milliliters
Lead	0.001	Classroom 12	CF022	F01	Flush Sample taken 30 Seconds after Second
Lead	0.001	Classroom 12	CF022	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.004	Classroom 12	CF021	P1	First Primary draw of 125 milliliters
Lead	0.007	Classroom 12	CF021	P2	Second Primary draw of 125 milliliters
Lead	0.000	Classroom 12	CF021	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 12	CF021	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.009	Classroom 5	CF009	P1	First Primary draw of 125 milliliters
Lead	0.002	Classroom 5	CF009	P2	Second Primary draw of 125 milliliters
Lead	0.002	Classroom 5	CF009	F01	Flush Sample taken 30 Seconds after Second
Lead	0.001	Classroom 5	CF009	F02	Flush Sample taken 2 minutes after First Flush
Lead	[redacted]	Classroom 11	CF015	P1	First Primary draw of 125 milliliters
Lead	[redacted]	Classroom 11	CF015	P2	Second Primary draw of 125 milliliters
Lead	0.014	Classroom 11	CF015	F01	Flush Sample taken 30 Seconds after Second
Lead	0.011	Classroom 11	CF015	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.003	Classroom 11	CF016	P1	First Primary draw of 125 milliliters
Lead	0.003	Classroom 11	CF016	P2	Second Primary draw of 125 milliliters
Lead	0.005	Classroom 11	CF016	F01	Flush Sample taken 30 Seconds after Second
Lead	0.004	Classroom 11	CF016	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.009	Classroom 21	CF027	P1	First Primary draw of 125 milliliters
Lead	0.007	Classroom 21	CF027	P2	Second Primary draw of 125 milliliters
Lead	0.000	Classroom 21	CF027	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 21	CF027	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.012	Classroom 6	CF010	P1	First Primary draw of 125 milliliters
Lead	0.004	Classroom 6	CF010	P2	Second Primary draw of 125 milliliters
Lead	0.002	Classroom 6	CF010	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 6	CF010	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.009	Classroom 21	CF028	P1	First Primary draw of 125 milliliters
Lead	0.002	Classroom 21	CF028	P2	Second Primary draw of 125 milliliters
Lead	0.001	Classroom 21	CF028	F01	Flush Sample taken 30 Seconds after Second
Lead	0.001	Classroom 21	CF028	F02	Flush Sample taken 2 minutes after First Flush
Lead	[redacted]	Classroom 19	CF024	P1	First Primary draw of 125 milliliters
Lead	0.003	Classroom 19	CF024	P2	Second Primary draw of 125 milliliters
Lead	0.004	Classroom 19	CF024	F01	Flush Sample taken 30 Seconds after Second
Lead	0.003	Classroom 19	CF024	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.005	Community Room	KC003	P1	First Primary draw of 125 milliliters
Lead	0.002	Community Room	KC003	P2	Second Primary draw of 125 milliliters
Lead	0.000	Community Room	KC003	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Community Room	KC003	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.009	Classroom 19	CF023	P1	First Primary draw of 125 milliliters
Lead	0.009	Classroom 19	CF023	P2	Second Primary draw of 125 milliliters
Lead	0.001	Classroom 19	CF023	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 19	CF023	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.015	Hallway	DW002	P1	First Primary draw of 125 milliliters
Lead	0.006	Hallway	DW002	P2	Second Primary draw of 125 milliliters
Lead	0.004	Hallway	DW002	F01	Flush Sample taken 30 Seconds after Second
Lead	0.001	Hallway	DW002	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.002	Classroom 9	CF012	P1	First Primary draw of 125 milliliters
Lead	0.004	Classroom 9	CF012	P2	Second Primary draw of 125 milliliters
Lead	0.002	Classroom 9	CF012	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 9	CF012	F02	Flush Sample taken 2 minutes after First Flush
Lead	[redacted]	Hallway	DW001	P1	First Primary draw of 125 milliliters
Lead	0.006	Hallway	DW001	P2	Second Primary draw of 125 milliliters
Lead	0.004	Hallway	DW001	F01	Flush Sample taken 30 Seconds after Second
Lead	0.001	Hallway	DW001	F02	Flush Sample taken 2 minutes after First Flush

ANALYTE	RESULT (mg\L)	Sample Location	Sample Description	Site Code	Site Code Description
Lead	0.014	Classroom 15	CF018	P1	First Primary draw of 125 milliliters
Lead	0.005	Classroom 15	CF018	P2	Second Primary draw of 125 milliliters
Lead	0.002	Classroom 15	CF018	F01	Flush Sample taken 30 Seconds after Second
Lead	0.002	Classroom 15	CF018	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.010	Classroom 15	CF017	P1	First Primary draw of 125 milliliters
Lead	0.014	Classroom 15	CF017	P2	Second Primary draw of 125 milliliters
Lead	0.002	Classroom 15	CF017	F01	Flush Sample taken 30 Seconds after Second
Lead	0.002	Classroom 15	CF017	F02	Flush Sample taken 2 minutes after First Flush
Lead	[illegible]	DHHS Office	CF029	P1	First Primary draw of 125 milliliters
Lead	0.012	DHHS Office	CF029	P2	Second Primary draw of 125 milliliters
Lead	0.002	DHHS Office	CF029	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	DHHS Office	CF029	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.013	Classroom 4	CF008	P1	First Primary draw of 125 milliliters
Lead	0.006	Classroom 4	CF008	P2	Second Primary draw of 125 milliliters
Lead	0.001	Classroom 4	CF008	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 4	CF008	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.007	Classroom 3	CF007	P1	First Primary draw of 125 milliliters
Lead	0.006	Classroom 3	CF007	P2	Second Primary draw of 125 milliliters
Lead	0.003	Classroom 3	CF007	F01	Flush Sample taken 30 Seconds after Second
Lead	0.002	Classroom 3	CF007	F02	Flush Sample taken 2 minutes after First Flush
Lead	[illegible]	Classroom 10	CF014	P1	First Primary draw of 125 milliliters
Lead	0.007	Classroom 10	CF014	P2	Second Primary draw of 125 milliliters
Lead	0.004	Classroom 10	CF014	F01	Flush Sample taken 30 Seconds after Second
Lead	0.003	Classroom 10	CF014	F02	Flush Sample taken 2 minutes after First Flush
Lead	[illegible]	Classroom 14	CF026	P1	First Primary draw of 125 milliliters
Lead	[illegible]	Classroom 14	CF026	P2	Second Primary draw of 125 milliliters
Lead	[illegible]	Classroom 14	CF026	F01	Flush Sample taken 30 Seconds after Second
Lead	0.004	Classroom 14	CF026	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.005	Classroom 17	CF019	P1	First Primary draw of 125 milliliters
Lead	0.003	Classroom 17	CF019	P2	Second Primary draw of 125 milliliters
Lead	0.001	Classroom 17	CF019	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 17	CF019	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.000	Classroom 14	CF025	P1	First Primary draw of 125 milliliters
Lead	0.003	Classroom 14	CF025	P2	Second Primary draw of 125 milliliters
Lead	0.003	Classroom 14	CF025	F01	Flush Sample taken 30 Seconds after Second
Lead	0.002	Classroom 14	CF025	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.009	Classroom 10	CF013	P1	First Primary draw of 125 milliliters
Lead	[illegible]	Classroom 10	CF013	P2	Second Primary draw of 125 milliliters
Lead	0.003	Classroom 10	CF013	F01	Flush Sample taken 30 Seconds after Second
Lead	0.003	Classroom 10	CF013	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.013	Classroom 17	CF020	P1	First Primary draw of 125 milliliters
Lead	0.004	Classroom 17	CF020	P2	Second Primary draw of 125 milliliters
Lead	0.005	Classroom 17	CF020	F01	Flush Sample taken 30 Seconds after Second
Lead	0.003	Classroom 17	CF020	F02	Flush Sample taken 2 minutes after First Flush
Lead	[illegible]	Classroom 2	CF006	P1	First Primary draw of 125 milliliters
Lead	0.003	Classroom 2	CF006	P2	Second Primary draw of 125 milliliters
Lead	0.001	Classroom 2	CF006	F01	Flush Sample taken 30 Seconds after Second
Lead	0.001	Classroom 2	CF006	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.002	Classroom 7	CF011	P1	First Primary draw of 125 milliliters
Lead	0.000	Classroom 7	CF011	P2	Second Primary draw of 125 milliliters
Lead	0.002	Classroom 7	CF011	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 7	CF011	F02	Flush Sample taken 2 minutes after First Flush
Lead	[illegible]	Proposed Pre K	CF031	P1	First Primary draw of 125 milliliters
Lead	0.003	Proposed Pre K	CF031	P2	Second Primary draw of 125 milliliters
Lead	0.002	Proposed Pre K	CF031	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Proposed Pre K	CF031	F02	Flush Sample taken 2 minutes after First Flush

ANALYTE	RESULT (mg\L)	Sample Location	Sample Description	Site Code	Site Code Description
Lead	0.010	Proposed Pre K	CF030	P1	First Primary draw of 125 milliliters
Lead	0.003	Proposed Pre K	CF030	P2	Second Primary draw of 125 milliliters
Lead	0.007	Proposed Pre K	CF030	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Proposed Pre K	CF030	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.012	Classroom 1	CF004	P1	First Primary draw of 125 milliliters
Lead	0.007	Classroom 1	CF004	P2	Second Primary draw of 125 milliliters
Lead	0.004	Classroom 1	CF004	F01	Flush Sample taken 30 Seconds after Second
Lead	0.002	Classroom 1	CF004	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.005	Classroom 1	DW005	P1	First Primary draw of 125 milliliters
Lead	0.003	Classroom 1	DW005	P2	Second Primary draw of 125 milliliters
Lead	0.003	Classroom 1	DW005	F01	Flush Sample taken 30 Seconds after Second
Lead	0.002	Classroom 1	DW005	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.002	Proposed Pre K	CF030	CA1	First Sequential Sample
Lead	0.001	Proposed Pre K	CF030	CA2	Second Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA3	Third Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA4	Forth Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA5	Fifth Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA6	Sixth Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA7	Seventh Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA8	Eigth Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA9	Ninth Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA10	Tenth Sequential Sample
Lead	0.062	Classroom 11	CF015	CB1	First Sequential Sample
Lead	0.008	Classroom 11	CF015	CB2	Second Sequential Sample
Lead	0.008	Classroom 11	CF015	CB3	Third Sequential Sample
Lead	0.007	Classroom 11	CF015	CB4	Forth Sequential Sample
Lead	0.007	Classroom 11	CF015	CB5	Fifth Sequential Sample
Lead	0.007	Classroom 11	CF015	CB6	Sixth Sequential Sample
Lead	0.007	Classroom 11	CF015	CB7	Seventh Sequential Sample
Lead	0.006	Classroom 11	CF015	CB8	Eigth Sequential Sample
Lead	0.006	Classroom 11	CF015	CB9	Ninth Sequential Sample
Lead	0.006	Classroom 11	CF015	CB10	Tenth Sequential Sample
Lead	0.002	Classroom 21	CF027	CC1	First Sequential Sample
Lead	0.000	Classroom 21	CF027	CC2	Second Sequential Sample
Lead	0.000	Classroom 21	CF027	CC3	Third Sequential Sample
Lead	0.000	Classroom 21	CF027	CC4	Forth Sequential Sample
Lead	0.000	Classroom 21	CF027	CC5	Fifth Sequential Sample
Lead	0.000	Classroom 21	CF027	CC6	Sixth Sequential Sample
Lead	0.000	Classroom 21	CF027	CC7	Seventh Sequential Sample
Lead	0.000	Classroom 21	CF027	CC8	Eigth Sequential Sample
Lead	0.000	Classroom 21	CF027	CC9	Ninth Sequential Sample
Lead	0.000	Classroom 21	CF027	CC10	Tenth Sequential Sample

Note: Results of "Not Detected" have been converted to a numerical value of zero to allow for ease of sorting

Results in RED exceed 15 ppb
1 ppb = 0.001 mg\L

Director Creagh:

The following package includes documents relating to the Flint Water issue.

- **Flint Water Advisory Task Force.** Governor Snyder announced this independent Flint Water Advisory Task Force on October 21, 2015. Its members include the following:

  Ken Sikkema, Co-Chair – Senior Policy Fellow, Public Sector Consultants
  Chris Kolb, Co-Chair – President, Michigan Environmental Council
  Matthew Davis, M.D., M.A.P.P - University of Michigan
  Lawrence Reynolds, M.D. - President, Mott Children's Health Center
  Eric Rothstein – Principal, Galardi Rothstein Group

  The Flint Water Advisory Task Force has corresponded with the Governor as follows:

  - **December 29, 2015** – indicating that the DEQ failed in its responsibility to ensure safe drinking water for Flint residents.
  - December 15, 2015 – the Governor responded to a December 7, 2015 request and appointed Harvey Hollins as the Flint coordinator for the administration, and also retained Chris DeWitt for communication purposes.

- A On **December 23, 2015**, the **Michigan Auditor General** responded to specific questions regarding data and the sampling and data collection protocols raised by State Senator Ananich.

- **Timeline of the Flint Water Events** chronicles the activities and documents relating to the various issues of concern. There are specific resources attached to each entry which can be provided.

Also enclosed are additional background materials:

- Flint water FY 2016 Supplemental Budget Request
- DEQ's 18 Point Partnering Plan
- A set of EPA memoranda/communications addressing the federal Lead and Copper Rule
- Listing of the FOIAs requested relating to the Flint water issue.

Madhu R. Anderson

1 January 2105

December 29, 2015

Dear Governor Snyder:

The Flint Water Advisory Task Force, which you appointed on October 21, 2015, has devoted considerable effort and countless hours to our review of the contamination of the Flint water supply: what happened, why it occurred, and what is needed to prevent a recurrence in Flint or elsewhere in the state. We have also been assessing ongoing mitigation efforts to help assure that short- and long-term public health issues and water management concerns will be properly addressed to safeguard the health and well being of the Flint community.

Shortly after we began our work, we recognized the immediate need for better coordination of the state's response to the ongoing public health issues in Flint, and for assignment of a single person to provide this coordination. We addressed these concerns in a letter to you on December 7, 2015, and you responded with immediate adoption of these recommendations. We thank you for the commitment your response demonstrates.

In our continuing efforts, we have now interviewed numerous individuals at state and local levels; reviewed many documents, articles, and emails; and deliberated repeatedly as a group. Both individually and as a group, we have visited Flint several times during the past several weeks to meet with citizens, public health officials and healthcare providers, individuals who have water management responsibilities at the city and county levels, and other public officials.

It is clear to us, particularly as we listen to the people of Flint, that it is both critical and urgent to establish responsibility for what happened in their community and to ensure accountability. This is a first step in a long process to re-establish the trust they no longer have in their government and the agencies whose responsibility it is to protect their health. It is urgent because this deep distrust of government continues to compromise the effective delivery of protective services designed to address ongoing public health issues. It is for these reasons that we are sending this letter at this time.

We believe the primary responsibility for what happened in Flint rests with the Michigan Department of Environmental Quality (MDEQ). Although many individuals and entities at state and local levels contributed to creating and prolonging the problem, MDEQ is the government agency that has responsibility to ensure safe drinking water in Michigan. It failed in that responsibility and must be held accountable for that failure.

The Safe Drinking Water Act (SDWA) places responsibility for compliance with its requirements on the public water system. In this instance, the City of Flint had the responsibility to operate its water system within SDWA requirements, under the jurisdiction of the MDEQ. The role of the MDEQ is to ensure compliance with the SDWA through its regulatory oversight as the primary agency having enforcement responsibility for the Flint water system.

The MDEQ failed in three fundamental ways.

Regulatory Failure

We believe that in the Office of Drinking Water and Municipal Assistance (ODWMA) at MDEQ, a culture exists in which "technical compliance" is considered sufficient to ensure safe drinking water in Michigan.

This minimalist approach to regulatory and oversight responsibility is unacceptable and simply insufficient to the task of public protection. It led to MDEQ's failure to recognize a number of indications that switching the water source in Flint would—and did—compromise both water safety and water quality. The MDEQ made a number of decisions that were, and continue to be, justified on the basis that federal rules "allowed" those decisions to be made. ODWMA must adopt a posture that is driven not by this minimalist technical compliance approach, but rather by one that is founded on *what needs to be done to assure drinking water safety.*

A culture change must occur within ODWMA. It must be driven by a mission that is aspirational regarding the role of the MDEQ in ensuring the safety and the quality of Michigan's drinking water. We believe, and have expressed to MDEQ Director Dan Wyant, that as a Great Lakes State, Michigan should aspire to have the safest drinking water in the nation, rather than merely aiming for technical compliance with regulatory requirements.

Failure in Substance and Tone of MDEQ Response to the Public

Throughout 2015, as the public raised concerns and as independent studies and testing were conducted and brought to the attention of MDEQ, the agency's response was often one of aggressive dismissal, belittlement, and attempts to discredit these efforts and the individuals involved. We find both the tone and substance of many MDEQ public statements to be completely unacceptable. In a real way, the MDEQ represents the public, including the very individuals it treated dismissively and disrespectfully in public statements. We recognize that the agency might disagree with the opinions of others on a variety of issues, including testing protocol, interpretation of testing results, the requirements of federal law and rules, and other matters. What is disturbing about MDEQ's responses, however, is their persistent tone of scorn and derision. In fact, the MDEQ seems to have been more determined to discredit the work of others—who ultimately proved to be right—than to pursue its own oversight responsibility.

Failure in MDEQ Interpretation of the Lead and Copper Rule

The federal Lead and Copper Rule (LCR) is central to what happened in Flint, because that rule, at least theoretically, is designed to prevent lead and copper contamination of drinking water. The federal LCR calls for "optimized corrosion control treatment," which the MDEQ did not require in the switch to the Flint River. Prior to the switch, MDEQ staff instructed City of Flint water treatment staff that corrosion control treatment (CCT) was not necessary until two six-month monitoring periods had been conducted. The need for CCT would be evaluated after the results from those two monitoring periods were reviewed. The decision not to require CCT, made at the direction of the MDEQ, led directly to the contamination of the Flint water system.

The MDEQ seems to have taken different positions on whether it faithfully followed the LCR in the Flint situation. It first maintained that it followed the LCR, then stated that it did not follow the rule properly, and most recently claimed that a federal memorandum issued by the US EPA in early November 2015 suggests that the original MDEQ interpretation was possibly correct.

We are not convinced. Even the MDEQ's latest interpretation of the US EPA's November memorandum is overly legalistic and misunderstands the intent of the LCR, which is to minimize risks of lead and copper exposure for human health.

We believe ODWMA's single-minded legalistic focus is the heart of the problem, and it is part of the "technical compliance" culture described above. ODWMA should not be basing its actions solely on a

legally possible interpretation of the LCR. It should be focusing on how to protect Michigan's citizens from lead in drinking water.

We met with MDEQ Director Wyant on December 16, 2015, to discuss these issues, as well as many others. We note his substantial agreement with many of our conclusions, particularly as it relates to the regulatory failure and the abysmal public response of his agency. It is our understanding that he has drawn similar conclusions in his own evaluation of the MDEQ's role in the Flint water crisis. At the same time, it was disappointing to hear his weak defense of the CCT decision based on the EPA's November 2015 memorandum.

We are not finished with our work. Other individuals and entities made poor decisions, contributing to and prolonging the contamination of the drinking water supply in Flint. As an example, we are particularly concerned by recent revelations of MDHHS's apparent early knowledge of, yet silence about, elevated blood lead levels detected among Flint's children. We also feel it important to further review local government decision processes under emergency management. Our final report will highlight and discuss those concerns, among many others, to provide some context to a comprehensive series of recommendations. **As stated earlier in this letter, however, we believe that establishing responsibility is a critical and urgent need, and one that should not wait for our final report in 2016. Individuals and agencies responsible must be held accountable in a timely fashion.**

It is our hope that the heightened awareness of the dangers of lead poisoning can be an opportunity to make Michigan safer, particularly for its children. Drinking water must be recognized as a potential source of health risk exposure when water lines and fixtures containing lead are disturbed or compromised. Proper testing, not only in high-risk areas but also in facilities serving children (e.g., schools), must be considered. Facilitating long-term financing of a model public health program, and also replacement of lead-containing water service lines and fixtures, would enable Michigan to realize a positive lasting legacy from the tragedy of the Flint water crisis. Our final report will address some of these issues.

The City of Flint's water customers—fellow Michigan citizens—were needlessly and tragically exposed to toxic levels of lead through their drinking water supply. They deserve a commitment to properly assess responsibility and ensure accountability. They also deserve a commitment to needed mitigation in both the short and long term. The Flint water crisis never should have happened. Having failed to prevent it, state government should coordinate a sustained, public-health-focused response to remedy, to the fullest extent possible, the impacts on the Flint community.

Respectfully yours,

Flint Water Advisory Task Force:

Matt Davis
Chris Kolb
Larry Reynolds
Eric Rothstein
Ken Sikkema

STATE OF MICHIGAN

RICK SNYDER
GOVERNOR

EXECUTIVE OFFICE
LANSING

BRIAN CALLEY
LT. GOVERNOR

December 15, 2015

Dear Flint Water Advisory Task Force Members:

Thank you for your correspondence on Dec. 7, and, most importantly, for your hard work to promote public health and protect our residents as we move forward. Your efforts are both respected and appreciated.

As acknowledged in your letter, we have taken many steps to address the challenges in Flint as they relate to reducing lead exposure. I am pleased to see the progress since October, and recognize there is more work that must be done to ensure that this progress continues.

At the state level, there has been a confluence of efforts between Departments of Environmental Quality and the Department of Health and Human Services to coordinate with the Genesee County Health Department, local schools, and our partners in the non-profit community.

These partners are making progress, and we know we must always strive to improve practices and communication for continual improvement.

You make a solid recommendation to establish a person who is independent of any one of the involved state agencies to serve as the point person to coordinate the ongoing work. I am recommending that Harvey Hollins, director of the Office of Urban Initiatives, carry out this effort. Harvey is well-versed in the issues and the challenges faced by our cities and will be effective in this role. Senior members of our executive team will continue to engage with your task force and provide direction and support to Harvey to ensure you will have continued support and cooperation. We also have retained Chris DeWitt, a veteran communications specialist, to strengthen community outreach efforts to make sure residents have access to the information they need.

I also support your suggestion of a dashboard to make information about our work and progress more accessible to the Flint community. These are critical measures that can be used as we look the challenges and progress in Flint, but also can be a part of efforts moving forward in other areas of our state. It's important that people have confidence that we are working to address any problems and will take the necessary actions to improve interaction among city, state and federal agencies. We also will continue to work with the medical community to consider how we can work together on wraparound needs of children who might experience health problems.

People in Flint and across our state deserve safe, clean water. I want them to be confident that the water coming out of their tap is safe for their families. And I want them to trust that their government – at all levels – is working effectively to protect them.

I thank you again for investing your time and expertise in this vitally important effort.

Sincerely,

Rick Snyder
Governor

December 7, 2015

Dear Governor Snyder:

On Wednesday, November 18, 2015, the Flint Water Advisory Task Force met with representatives of the Michigan Department of Environmental Quality (MDEQ) and the Michigan Department of Health and Human Services (MDHHS) to discuss elements of the 10-point Action Plan designed to address various issues related to the ongoing public health protection challenges precipitated by lead in the Flint water supply. These discussions were held at our request as part of our task to make recommendations to prevent a similar occurrence in Flint or elsewhere, and also to monitor ongoing mitigation efforts.

Subsequent to those meetings, on Tuesday, November 24, 2015, members of the Task Force participated in a conference call with yourself, members of the Administration, and representatives of these agencies to discuss the progress to date on the 10-point Action Plan, as well as several other related issues.

We want to acknowledge the steps that have already been taken to implement the action plan, specifically in the areas of outreach efforts to facilitate blood lead testing for children, communication with health care providers in the Flint community about the importance of testing children for lead, and the training of additional public health nurses in the Genesee County Health Department. We do believe, however, that additional steps need to be taken to reach additional children for blood lead testing, assure proper follow-up with children found to have elevated blood lead levels, and to continue water testing. We will continue to assess state and local efforts and make recommendations regarding specific steps that we believe are warranted.

One primary concern we have at this point is that the current efforts appear to be taking place in the absence of a larger project coordination framework that measures results and clearly delineates responsibilities for continuing actions to protect public health. We believe the state is best positioned to facilitate this larger framework, which should address the following:

1. The need for MDHHS and MDEQ—and, possibly, other state agencies--to set goals for actions in collaboration with local and federal agencies and organizations.
2. The need for a set of corresponding timelines for the goals.
3. The need to establish responsibility for meeting the goals in a timely fashion and for contingency plans for the state if the goals are not being met.
4. The need for clear, regular communication with the Flint community and stakeholder groups regarding action steps and updates.

We also believe it important that a single person or entity—potentially independent of any one particular state agency and mutually agreeable to this Task Force and you, Governor—be established to provide effective coordination of ongoing activities and reporting on the status of mitigation measures. For this, we also believe a readily understood "dashboard" should be developed that reports on the goals, timelines and assignments. This will enable members of the Flint community, public health providers, and state agencies to know about the status of the Flint water crisis mitigation program, as

well as promote coordination and accountability. The Task Force is prepared to assist in the development of that dashboard.

We believe it is vitally important that trusted members of the Flint community be engaged in communication on this issue, as well as the distribution of information conveyed by our suggested dashboard reporting. Accordingly, in advance of our final report, we would like to ensure the independent coordinator suggested above engage trusted community groups to begin rebuilding community trust in state actions.

We appreciate your personal interest in this issue, commitment to assisting the Task Force in our review, and—most importantly—commitment to ensuring that the full measure of state resources are brought forward to protect the public health in Flint and throughout the state.

Respectfully yours,

Flint Water Advisory Task Force:

Dr. Matt Davis

Chris Kolb

Dr. Larry Reynolds

Eric Rothstein

Ken Sikkema

FLINT WATER ADVISORY TASK FORCE

BACKGROUND

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Friday, October 16, 2015
10:01 AM

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Final

STATE OF MICHIGAN
EXECUTIVE OFFICE
LANSING

RICK SNYDER
GOVERNOR

BRIAN CALLEY
LT. GOVERNOR

Contacts: Sara Wurfel or Dave Murray 517-335-6397	**FOR IMMEDIATE RELEASE** Wednesday, Oct. 21, 2015

Gov. Rick Snyder announces Flint Water Task Force to review state, federal and municipal actions, offer recommendations

Experts in public health, water management, environmental protection to focus on steps to protect residents

LANSING, Mich. – Gov. Rick Snyder today announced the creation of an independent advisory task force charged with reviewing actions regarding water use and testing in Flint and offer recommendations for future guidelines to protect the health and safety of all state residents.

Task force members include experts in public health and medicine, water management, and environmental protection from both sides of the aisle, and will be co-chaired by Ken Sikkema of Public Sector Consultants and Chris Kolb, of the Michigan Environmental Council. Also serving will be Dr. Matthew Davis of the University of Michigan Health System, Eric Rothstein, of the Galardi Rothstein Group and Dr. Lawrence Reynolds of Mott Children's Health Center in Flint.

"Transitioning back to the Detroit Water and Sewerage Department-Great Lakes Water Authority is a good first step to protecting public health in Flint, but it's not the last step," Snyder said. "Bringing in outside experts to evaluate our actions and help monitor and advise on potential changes to law, procedures and practices will be key to continuing work on the comprehensive action plan and ensuring safe drinking water for all the residents in Flint and all of Michigan."

Snyder said the administration will fully cooperate with task force members, saying he wants an unbiased report focusing on steps taken in the past and recommendations that could improve practices to ensure all residents have access to safe, clean water.

Ken Sikkema is a senior policy fellow at Public Sector Consultants, where he specializes in public finance, environment, and energy policy. Prior to joining the firm, Sikkema served in both the Michigan House and Senate, culminating with four years as Senate majority leader. He has also served as both an adjunct and visiting professor at Grand Valley State University.

Chris Kolb is president of the Michigan Environmental Council, a statewide coalition of 70 environmental, public health and faith-based nonprofit groups. Before joining the MEC, Kolb represented Ann Arbor in the state House for six years and served six years on the Ann Arbor City Council. He has been president of the MEC for six years.

Matthew Davis, M.D., M.A.P.P., is professor of pediatrics and internal medicine at the University of Michigan Health System and professor of public policy at the Gerald R. Ford School at the University of Michigan, having joined the faculty in 2000. Davis also is a professor of health management and policy at the School of Public Health. He previously served as the chief medical executive of the Michigan Department of Community Health/Department of Health and Human Services.

Eric Rothstein is a national water issues consultant and principal at the Galardi Rothstein Group. He served as an independent advisor on the creation of the Great Lakes Water Authority. Rothstein also has served as Jefferson County, Alabama's rate consultant and municipal adviser for litigation related to the county's bankruptcy and issuance of $1.7 billion in sewer warrants and led strategic financial planning for the City of Atlanta's Department of Watershed Management. He has more than 30 years of experience in water, wastewater and stormwater utility finance and rate-making assessments.

Lawrence Reynolds, M.D., is a pediatrician in Flint who serves as president of the Mott Children's Health Center. He received his medical degree from Howard University College of Medicine and has been in practice for 36 years. He has served as president of the Genesee County Medical Society and the Michigan Chapter of the American Academy of Pediatrics. He has been honored for his humanitarian and advocacy efforts on behalf of children from the Community Foundation of Greater Flint.

Snyder has said reconnecting with the authority is a critical step to resolving water quality issues and addressing related health concerns. It will not immediately resolve the city's problem with lead service lines or aging infrastructure. It will take time for pipes in Flint to become coated with the phosphate corrosion control.

To best protect public health, state and local authorities will continue to carry out steps outlined on Oct. 2 in a comprehensive action plan, including continued testing, the use of faucet filters and providing residents with accurate information about steps to eliminate lead exposure. The Michigan Departments of Environmental Quality and Health and Human Services are continuing to provide free water filters, free lead testing through the state laboratory for Flint water customers, and hiring additional staff to conduct health exposure monitoring for lead in drinking water.

####

After-Action Review Q&A

Is the After-Action Review Panel independent? They were appointed by the Governor.

None of the panel members are city, state or federal employees, and none have been previously involved in the drinking water situation in Flint. They bring diverse expertise in pediatrics and internal medicine, environmental protection, water and wastewater asset management, and environmental policy. We are pleased to have their participation.

What will the panel look at?

The After-Action Review Panel will look at the procedures and protocols used by the City of Flint, the Michigan DEQ and the U.S. EPA during and after its switch to using the Flint River as its source of drinking water. The group will also review whether the present procedures, protocols, statutes, policies and rules that govern drinking water systems are enough to protect the public health of Michigan residents.

Will the After-Action Review Panel look at corrosion control and the Lead and Copper Rule?

Yes. If necessary, the After-Action Review Panel could include proposed amendments to the Lead and Copper Rule in its final report to the Governor.

What types of information are you going to look at to make your determinations?

The After-Action Review Panel will have any and all information at its disposal, including reports, emails, permits and any other documents needed.

Will the panel be empowered to fire anyone, or is that a recommendation they can make?

The after-action review is focused on making proactive recommendations to prevent future problems with lead in drinking water and to better protect public health statewide.

Is the panel made up of drinking water or lead experts?

The panel includes four members with diverse expertise in water and medicine. Their areas of specialty include pediatrics and internal medicine, environmental protection, water and wastewater asset management, and environmental policy, and we are pleased to bring their experience to the issue.

How long is the after-action review going to take?

The After-Action Review Panel will summarize its work in a report to be presented to the Governor within 90 days.

So will the results and the report to the Governor be made public?
The full report will be made public.

How does this help the people of Flint?
The after-action review is designed specifically to ensure the state learns from the experience in Flint and can better protect public health going forward. In the meantime, the city has reconnected to the Great Lakes Water Authority, and residents are encouraged to continue to use water filters and other protective measures to ensure safe drinking water while the long-term fixes of connecting to the Karegnondi Water Authority and replacing outdated local lead infrastructure is completed.

GONGWER Michigan
The Capitol Record Since 1906

Volume #54, Report #209, Article #3--Wednesday, October 21, 2015
Senate Activity Report | House Activity Report

Snyder Names Flint Water Task Force

With controversy growing over how the state handled the water crisis in Flint, Governor Rick Snyder on Wednesday named a five-member independent advisory task force to investigate actions by the state involving water use and testing in the city.

As Mr. Snyder made the announcement, U.S. Rep. Dan Kildee (D-Flint) and Senate Minority Leader Jim Ananich (D-Flint) called for the federal Environmental Protection Agency to investigate the controversy and its handling by the Department of Environmental Quality.

Mr. Snyder's announcement and the separate calls by Mr. Kildee and Mr. Ananich come as revelations of some internal emails from the DEQ brought into question how seriously some officials viewed the problem.

When the state announced earlier this month it would push for Flint to be reconnected to the Detroit Water and Sewerage System - the city's emergency manager decided in 2014 to draw water from the Flint River while the city prepared to join a pipeline drawing water from Lake Huron after no agreement could be reached on a short-term contract with the Detroit system - Mr. Snyder said he would create the independent body.

Along with looking into how the state handled the crisis, which after more than a year of complaints about water taste and smell broke wide open this past summer when tests showed elevated levels of lead in the water, the task force is to make recommendations to the state for "future guidelines to protect the health and safety of all state residents."

Co-chairing the task force will be former Senate Majority Leader Ken Sikkema, now with Public Sector Consultants, and former Democratic Rep. Chris Kolb, now with the Michigan Environmental Council.

Also named to the task force is Matthew Davis of the University of Michigan Health System, Eric Rothstein of the Gaiardi Rothstein Group and Lawrence Reynolds of Mott Children's Health Center of Flint.

Mr. Snyder said he wanted an "unbiased report" that looked at past actions affecting the Flint water situation and recommendations to help ensure that all state residents have access to safe drinking water. He said administration officials would cooperate fully with the task force.

There was no time frame set on when the task force would issue a report.

Mr. Ananich on Wednesday, meanwhile, released a letter to the U.S. EPA asking for a formal review of the DEQ's handling of the Flint water situation, emphasizing that the public needed to know if "the misapplication of federal water testing rules was intentional or due to negligence.

"Our citizens deserve answers," Mr. Ananich said.

And Mr. Kildee also wrote to the EPA, saying to ensure failures like that with the Flint system does not occur again, an investigation into how the crisis occurred is necessary.

"Unfortunately, the citizens of Flint are the victims in this situation. They deserve a thorough investigation and answers to these questions," Mr. Kildee said in his letter.

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(DRAFT)
FLINT WATER ADVISORY TASK FORCE
AFTER-ACTION REVIEW

The Flint Water Task Force is an independent advisory panel appointed by Governor Rick Snyder charged with reviewing actions regarding water use and testing in Flint and with offering recommendations for future guidelines to protect the health and safety of all state residents.

The task force expects to summarize its work in a report to be presented to Governor Rick Snyder within ninety (90) days.

GOALS

The Flint River Task Force's goals are as follows:

- Complete a thorough review of all steps taken by state and local officials regarding the decision to switch the city of Flint's water source to the Flint River from the Detroit Water and Sewerage Department's system (DWSD).
  - Produce a timeline of actions
  - Establish why each action was taken

- Review the roles of the federal, state, and local officials in the decision-making process.
  - Identify best practices for federal, state, and local officials to work together in future similar situations
  - Evaluate where coordination between these entities could have been better, and how it could be improved

- Review federal, state, and local actions and protocols
  - Determine whether the proper procedures were followed
  - Identify which procedures should be changed

- Monitor and review the process, procedures, and protocols being followed as the City of Flint returns to the DWSD system
  - Ensure that proper corrosion controls and testing are in place
  - Highlight the appropriate actions that the City of Flint should follow when the switch is made to the Karegnondi Water Authority's system

- Assess future practices
  - Highlight practices that should change for communities in similar situations
  - Recommend changes in law, procedure, or practice to ensure all Michiganders are drinking safe water

AUDITOR GENERAL LETTER TO SENATOR ANANICH

DECEMBER 23, 2015

OAG
Office of the Auditor General
201 N. Washington Square, Sixth Floor • Lansing, Michigan 48913 • Phone: (517) 334-8050 • www.audgen.michigan.gov

Doug A. Ringler, CPA, CIA
Auditor General

December 23, 2015

The Honorable Jim Ananich
Senate Minority Leader
State Capitol, Room S-105
Lansing, Michigan

Dear Senator Ananich:

Enclosed are answers to the questions you posed in your October 20, 2015 letter to our office regarding the audit we are conducting of the Office of Drinking Water and Municipal Assistance (ODWMA), Department of Environmental Quality (DEQ), specific to lead contamination in the City of Flint's drinking water. Also enclosed are additional questions we developed that are relevant to these issues, along with five exhibits:

- A map showing Flint water samples by zip code.
- A map showing lead counts of 5 parts per billion or higher.
- Two charts showing the number of samples by time period and zip code.
- A time line of the Flint water review.

We appreciate the opportunity to assist you in answering questions regarding this topic. If you have further questions or a request for other services, please do not hesitate to contact our office.

Sincerely,

Doug Ringler

Doug Ringler
Auditor General

Enclosures

Q1: How does ODWMA ensure the data it receives is accurate?

A: With regard to the United States Environmental Protection Agency (EPA) Lead and Copper Rule (LCR) monitoring requirements, DEQ relies on the following key controls to ensure the accuracy of test results:

- State-owned laboratories test water samples.
- State-owned laboratories send test results directly to DEQ.
- The City of Flint Water Treatment Plant (Flint WTP) certifies whether sample sites are classified as tier 1*.

The current Flint WTP LCR sampling process includes:

1. DEQ informs the Flint WTP of the required water lead and copper sample size.
2. The Flint WTP determines the pool of tier 1 sites for sampling.
3. The Flint WTP selects the sample.
4. The Flint WTP sends out sample kits and instructions to residents for collecting water samples.
5. Residents leave samples and signed sampling forms outside their front doors.
6. The Flint WTP employee picks up samples and forms from residents.
7. The Flint WTP employee reviews sample forms for completeness.
8. The Flint WTP employee sends samples to the State-owned laboratories.
9. State-owned laboratories test samples and provide results directly to DEQ.
10. DEQ receives water lead and copper sample results, which include the following information: date collected, date received, address where collected, type of residence (e.g., single family or apartment), and sample point (e.g., kitchen sink or bathroom sink).
11. DEQ tracks, and follows up if necessary, the number of samples collected by the Flint WTP to help ensure that the required minimum number of samples are collected by the monitoring period deadline.

* Single-family or multiple-family residence with lead service line, lead solder copper piping constructed after 1982, or lead plumbing.

12. The Flint WTP submits lead and copper report to DEQ that certifies whether sample sites meet tier 1 criteria.

13. DEQ prepares the LCR 90th percentile calculation report.

During our review, we noted two potential improvements for the Flint WTP sampling process (see Question 5 of the additional questions answered by the OAG regarding tier 1 sample validity):

- DEQ could verify that the sampling pool was limited to only tier 1 sample sites to ensure that the Flint WTP is in compliance with the LCR (Title 40, Part 141, section 86(a)(3) of the *Code of Federal Regulations* [*CFR*]).
- DEQ could independently verify the validity of sample site certifications.

Q2: What accountability measures are in place for ODWMA staff who fail to follow data verification protocols?

A: DEQ does not provide any direct oversight over the Flint WTP and, therefore, does not have any accountability measures over the Flint WTP's LCR data verification protocols. DEQ's data verification protocol for lead and copper water sampling is limited to verification that the WTP certifies samples submitted to the State-owned laboratories for analysis (see steps 7 and 12 in the Flint WTP LCR sampling process noted in Question 1 above). We did not identify any instances in which ODWMA staff failed to verify that submitted samples were certified by the Flint WTP.

Q3: What accountability measures are in place for ODWMA staff who lie or misrepresent information to the EPA?

A: As with all classified employees, ODWMA staff must adhere to the rules and regulations established by the Michigan Civil Service Commission. If any ODWMA staff were determined to misrepresent information to the EPA, they would be subject to Civil Service Rule 2-6, Discipline, which allows an appointing authority to discipline an employee for just cause up to and including dismissal. We are not aware of any DEQ-established measures that are in addition to the Civil Service Rules.

We gained access to the e-mail accounts of key DEQ management (DEQ Director, Deputy Director, ODWMA Chief, and other key ODWMA staff) extending back to January 1, 2013. We did so to identify the key decision points and conversations that occurred leading up to and through the situation in Flint. Our review was also intended to determine whether State, Flint, or other officials attempted to conceal key test results or other information.

We noted one e-mail exchange between DEQ and the EPA that appears to be a significant contributor to the concern that DEQ misrepresented information to the EPA. The EPA requested clarification on February 26, 2015 regarding the type of optimized corrosion control treatment the Flint WTP was using. DEQ responded on February 27, 2015 that the city had an optimized corrosion control program in place, but DEQ did not provide any program details. DEQ informed us that the Flint WTP corrosion control program included performing

lead and copper monitoring for two consecutive six-month periods to determine whether corrosion control **treatment** would be necessary in the future. However, it appears the EPA interpreted corrosion control **program** to mean that corrosion control **treatment** was being performed.

On April 23, 2015, the EPA again inquired as to what the Flint WTP was doing for corrosion control **treatment**. DEQ responded on April 24, 2015 that the Flint WTP was not practicing corrosion control **treatment**.

Based on our review of this and other e-mails, we have no specific reason to believe that DEQ willfully misrepresented the information to the EPA.

Q4: What policies do DEQ and ODWMA have in place to escalate major infractions up the chain of command?

A: We did not note any instances of major infractions (i.e., intentional disregard of policies, laws, regulations or specific directions) committed by DEQ staff during the course of our review. DEQ does not have a formal policy or procedure in place to escalate major infractions performed by ODWMA employees; however, our review of DEQ correspondence confirmed the escalation of key issues up the chain of command related to the Flint situation. DEQ stated that its informal policy is for staff to notify the proper level of management of infractions to determine necessary action.

Application of the LCR

Q1: How did the Flint WTP become the primary water supplier for the City of Flint?

A: Upon notification of the City of Flint's plans to switch to the Karegnondi Water Authority (KWA) in April 2013, the Detroit Water and Sewerage Department (DWSD) submitted a letter to the City of Flint stating that it would terminate its agreement to provide water services on April 17, 2014.

According to DEQ management, the Flint WTP attempted to negotiate with the DWSD to maintain it as the City of Flint water supplier; however, after negotiations were unsuccessful, the City of Flint notified DEQ through a permit request of its intent to operate the Flint WTP full time using the Flint River. Although the Flint City Council voted in March 2013 in support of moving to the KWA pipeline, the vote was silent on the use of the Flint River as a temporary drinking water source.

DEQ informed us that in the 1990s, the City of Flint upgraded the Flint WTP to serve as a backup source of water for emergencies. In 2006, the Flint WTP began quarterly testing of the treated Flint River water at the Flint WTP to ensure water quality standards were met; however, the Flint WTP did not test the water's effect on the distribution system at consumer tap locations.

Q2. Did DEQ consult with the EPA prior to determining how to apply the LCR?

A: DEQ did not consult with the EPA on how to apply the LCR prior to implementing two consecutive six-month monitoring periods of the Flint WTP beginning July 1, 2014. Based on past experiences applying the LCR monitoring requirements, DEQ believed that it had appropriately applied the LCR requirements of a large water system.

Q3: When Flint switched to the Flint River water source, should corrosion control treatment have been maintained?

A: We believe that corrosion control treatment should have been maintained.

According to the LCR, a water system can achieve optimized corrosion control if it submits results of tap water monitoring for two consecutive six-month monitoring periods with acceptable lead levels. However, a water system that has optimized corrosion control, and which has treatment in place, should continue to operate and maintain optimal corrosion control treatment.

DEQ staff explained that they did not treat the switch to Flint River water as a new system, but as a new source. DEQ further stated that because the Flint River was a new water source and there was a change in chemicals needed to treat the new source, a corrosion control study was needed to determine the impact on the water distribution system. Therefore, it was DEQ's interpretation that two rounds of six-month monitoring were still needed to evaluate the water quality and determine optimal corrosion control treatment.

The Flint water system had optimal corrosion control treatment when the DWSD WTP was the water supplier. Based on our review of notes from a July 21, 2015 EPA and DEQ conference call on DEQ's implementation of the LCR regarding whether the Flint WTP should have continued to maintain corrosion control treatment, it appeared that the EPA did not agree with DEQ's interpretation of the LCR. Region 5 EPA staff explained that they would talk to the EPA headquarters about the interpretation of regulations and believes that systems that have been deemed optimized need to "maintain" corrosion control. The Region agreed to provide supporting regulatory citations for the language about maintaining corrosion control.

On November 3, 2015, the EPA issued a memorandum stating that the LCR had differing possible interpretations; however, the EPA concluded that it is important for large water systems to take the steps necessary to ensure that appropriate corrosion control treatment is maintained at all times, thus ensuring that public health is protected. Based on this clarification, it appears that corrosion control treatment should have been maintained.

Q4: Should DEQ have required the Flint WTP to start pursuing optimized corrosion control treatment after the first round of six-month sampling results were above the lead action level of 5 parts per billion (ppb)?

A: Yes. According to DEQ's application of the LCR, within six months after the end of the monitoring period in which the water sample results exceeded the acceptable lead level, DEQ should have required the Flint WTP to start pursuing optimized corrosion control treatment.

The LCR states that the lead action level is exceeded if the lead level, as determined by the 90th percentile calculation, is greater than 15 ppb. If the lead action level is exceeded, water systems are required to take additional actions including educating the public about lead in drinking water as well as commencing lead service line replacement if the water system has already installed corrosion control and/or source water treatment. However, for water systems that have not yet implemented corrosion control treatment, they can be deemed to have optimized corrosion control without installing treatment if they can demonstrate lead levels below 5 ppb for two consecutive six-month periods.

The first round of six-month sampling results was received in late March 2015. Because the results were 1 ppb over the lead action level of 5 ppb, DEQ would not be able to achieve two consecutive six-month periods below 5 ppb. Therefore, DEQ should have notified the Flint WTP to start pursuing optimized corrosion control treatment. However, DEQ waited until the second round of sampling was completed (June 30, 2015) to assess whether water sample results improved.

Water Samples

Q5: Did DEQ verify that only tier 1 sample sites were selected by the Flint WTP in the two rounds of six-month samples?

A: DEQ did not verify that only tier 1 sample sites were selected. DEQ relies on the Flint WTP's certification of sample sites and does not perform any independent verification of those certifications.

In a November 19, 2015 *Flint Journal* article, the Flint WTP indicated that it did not have the ability to ensure that all sites were tier 1. In fact, water samples came from the random distribution of 175 testing bottles without regard for whether the homes were at risk for high lead levels. DEQ issued a formal memorandum on November 9, 2015 requesting that the Flint WTP verify the classification of all prior sample items. The results are due back from the Flint WTP on December 30, 2015.

Q6: DEQ dropped two water sampling sites from its second six-month sample (January 1, 2015 through June 30, 2015). Was this appropriate?

A: Yes, it was appropriate for DEQ to drop these two water sampling sites. Federal regulation 40 *CFR* 141.86(a) states:

> ". . . each water system shall complete a materials evaluation of its distribution system in order to identify a pool of targeted sampling sites that meets the requirements of this section . . . All sites from which first draw samples are collected shall be selected from this pool . . . Sampling sites may not include faucets that have point-of-use or point-of-entry treatment devices designed to remove inorganic contaminants."

This regulation also requires that a water system's targeted sampling pool consist of only tier 1 sampling sites if an adequate number is available to meet monitoring requirements.

According to federal regulation 40 *CFR* 141.86(f), the State may invalidate a water sample if it determines that the sample was taken from a site that did not meet the site selection criteria. A sample invalidated per this regulation does not count toward determining lead or copper 90th percentile levels or toward meeting the minimum monitoring requirements.

DEQ dropped one water sample site from its 90th percentile calculations because the site was from a business that does not meet the tier 1 requirements of being a single-family or multiple-family residence. The second sample site was dropped because the home had a point-of-entry treatment device to filter contaminants. Based on the criteria specified above, it appears that DEQ's rationale for dropping the samples from these two sites appropriately met the requirements for invalidating samples per federal regulation 40 *CFR* 141.86.

Q7: Was flushing of the taps the night before drawing a sample an appropriate sample methodology?

A: Yes. The LCR requires that samples be a first draw of water after six hours of stagnation. The LCR does not indicate whether or not the water line should be flushed prior to collecting the sample. In the sample instructions, DEQ required preflushing to ensure that sampled faucets were not stagnant for an excessive period of time beyond the targeted six hours (e.g., rarely used faucets or when a homeowner has been gone for an extended period of time.)

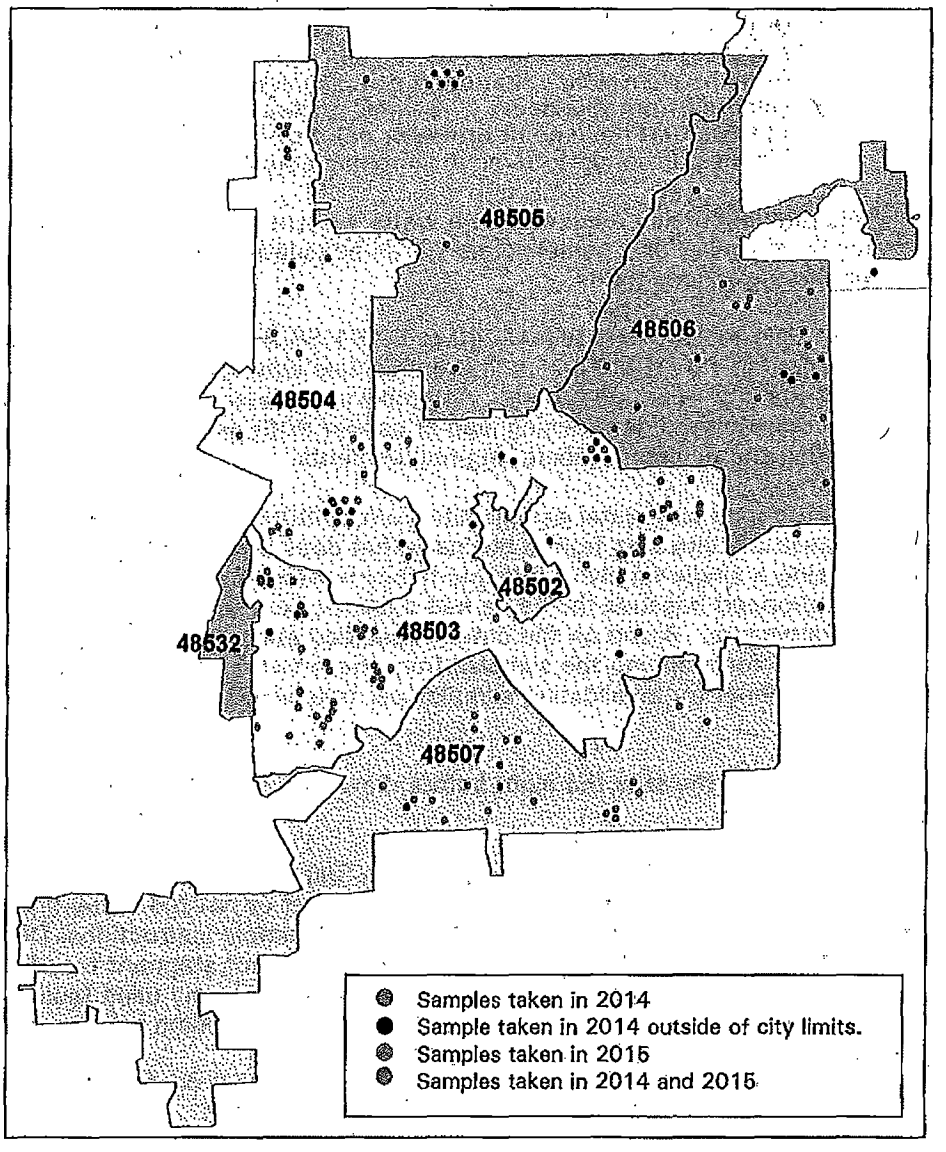
The LCR requires six hours of stagnation; however, it does not preclude DEQ from instructing residents to flush prior to stagnation.

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Flint WTP 2014 and 2015 Sample Locations (Exhibit #1)

In calendar year 1992, the Flint WTP established a tier 1 sample site pool for LCR monitoring. With the change to the Flint River water, the Flint WTP needed to increase the pool of sample locations because of additional sampling requirements. The following exhibit documents the 2014 and 2015 sample locations for LCR monitoring. Based on the data obtained during our review, we could not determine how the locations were selected or whether they were properly classified as tier 1 sample sites.

As noted in Question 5 of the additional questions answered by the OAG, DEQ has requested the Flint WTP to verify the tier 1 classification of all prior sample items.

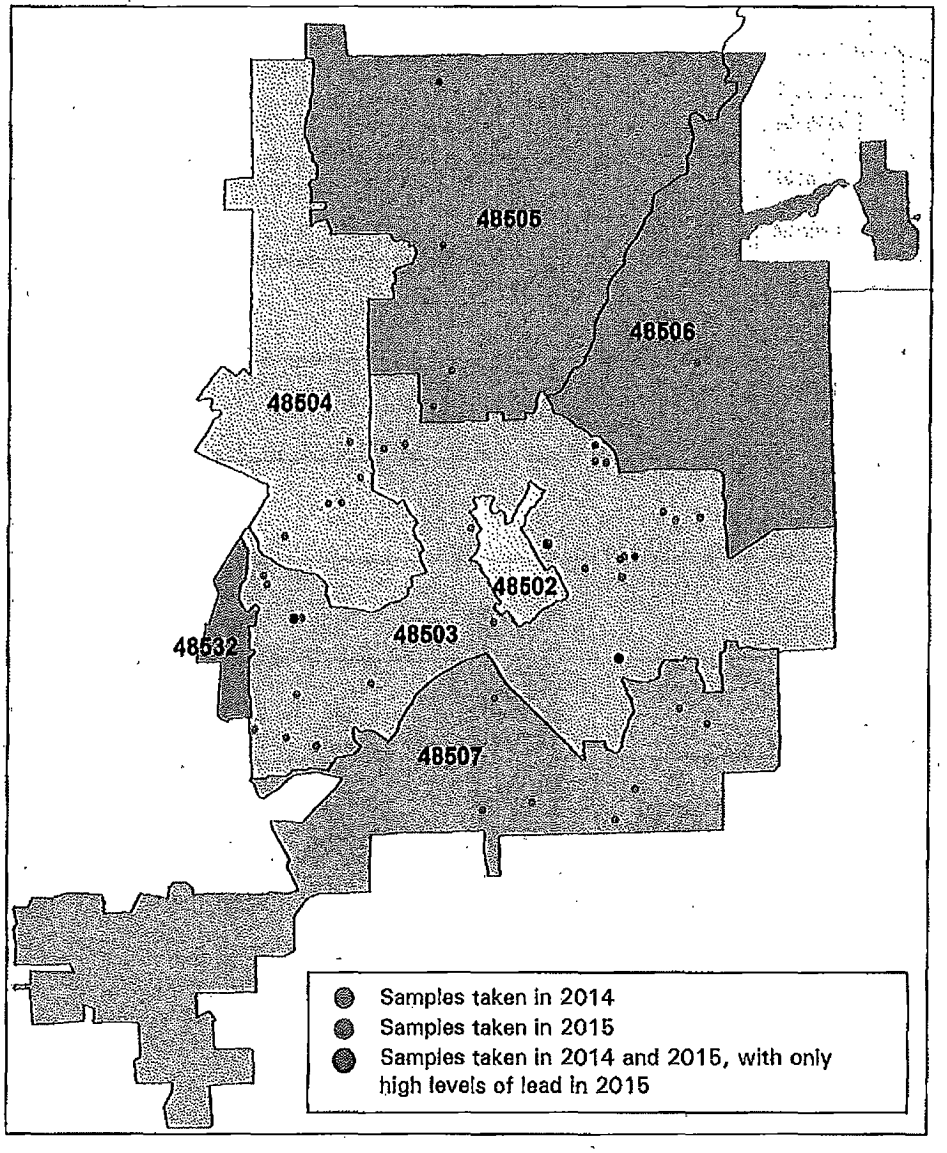


Source: The OAG prepared this map using data obtained from DEQ and ©OpenStreetMap contributors (opendatacommons.org). The sample locations are approximate.

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Flint WTP 2014 and 2015 Sample Locations With Lead Counts of 5 Parts Per Billion or Higher (Exhibit #2)

This exhibit documents the 2014 and 2015 sample locations with lead counts of 5 ppb or higher. This information is used in aggregate by DEQ to determine if the city has optimized lead levels.

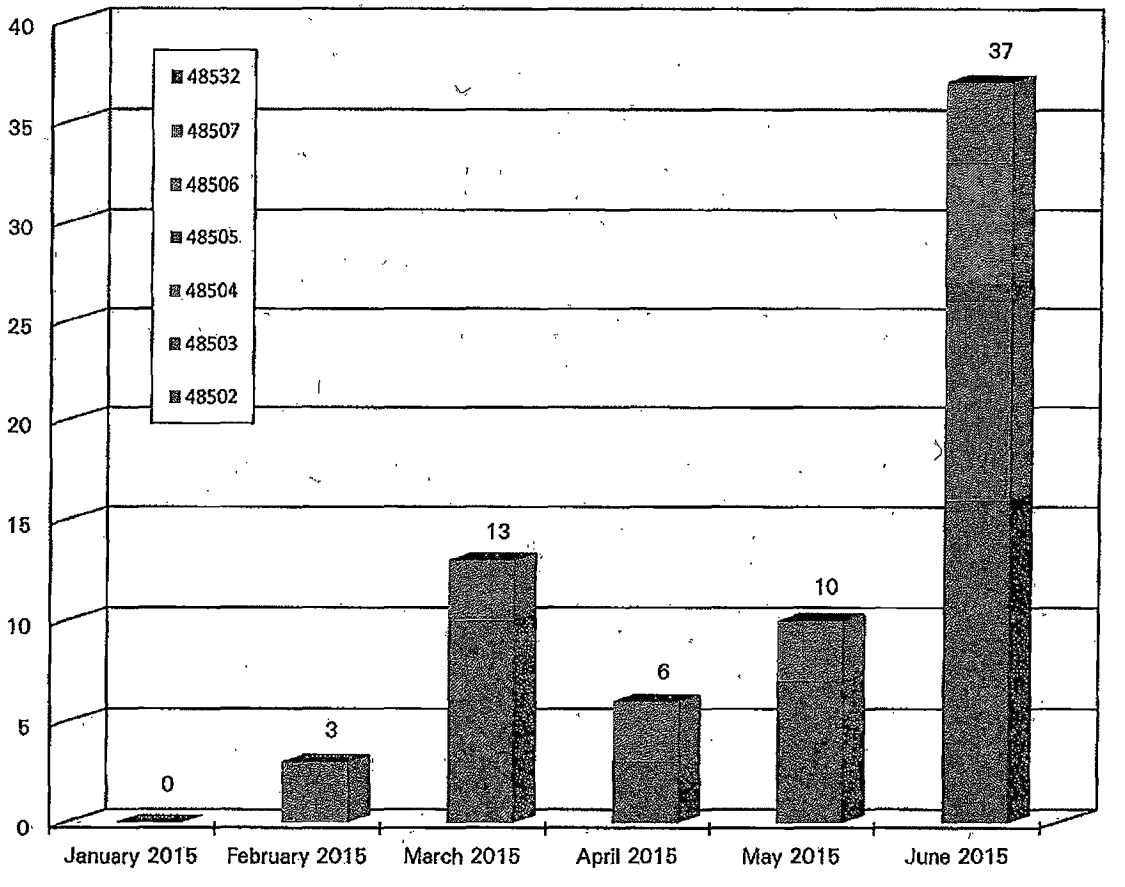


Source: The OAG prepared this map using data obtained from DEQ and ©OpenStreetMap contributors (opendatacommons.org). The sample locations are approximate.

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Flint WTP 2015 Number of Samples by Time Period and Zip Code (Exhibit #3)

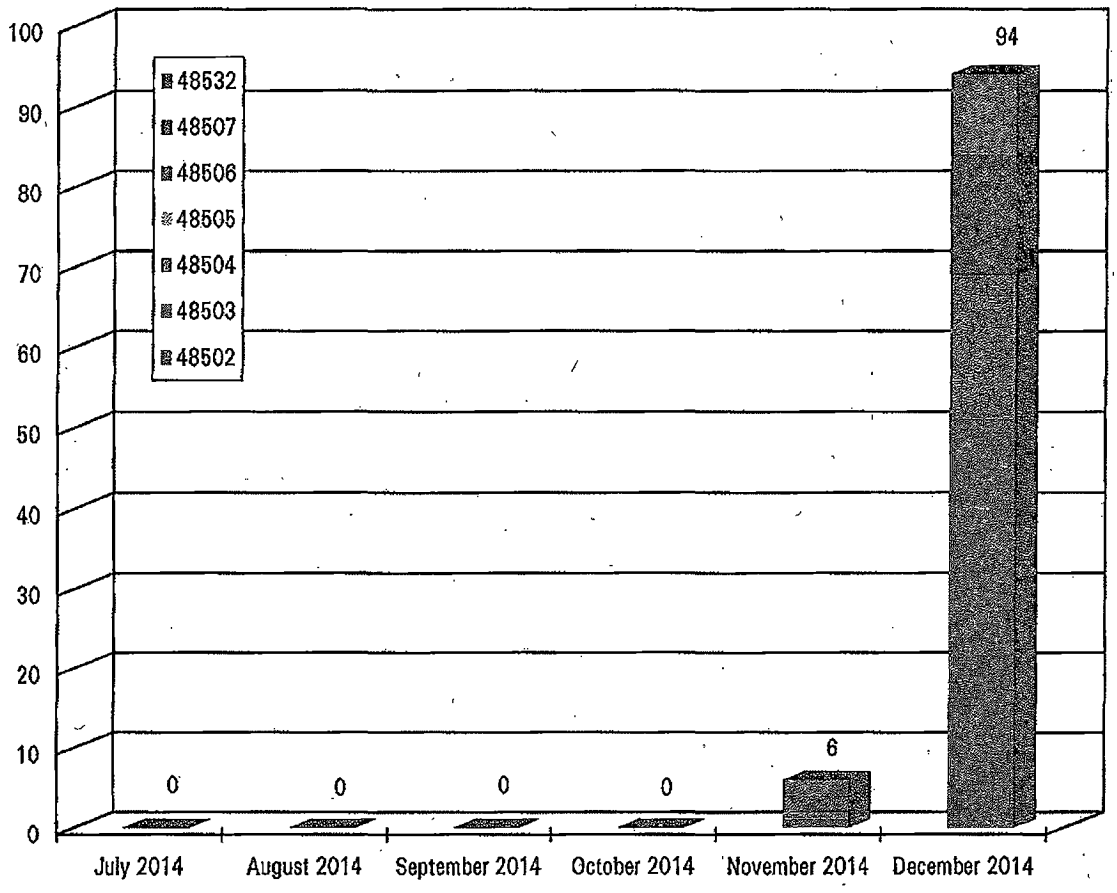
This chart expands on Exhibit #1 to show a summary by zip code and time of selection within the sampling period. Based on the data obtained during our review, we could not determine if the lateness of selection within the monitoring period affected the appropriateness of the sample items.



Source: The OAG prepared this chart using data obtained from DEQ.

Flint WTP 2014 Number of Samples by Time Period and Zip Code (Exhibit #4)

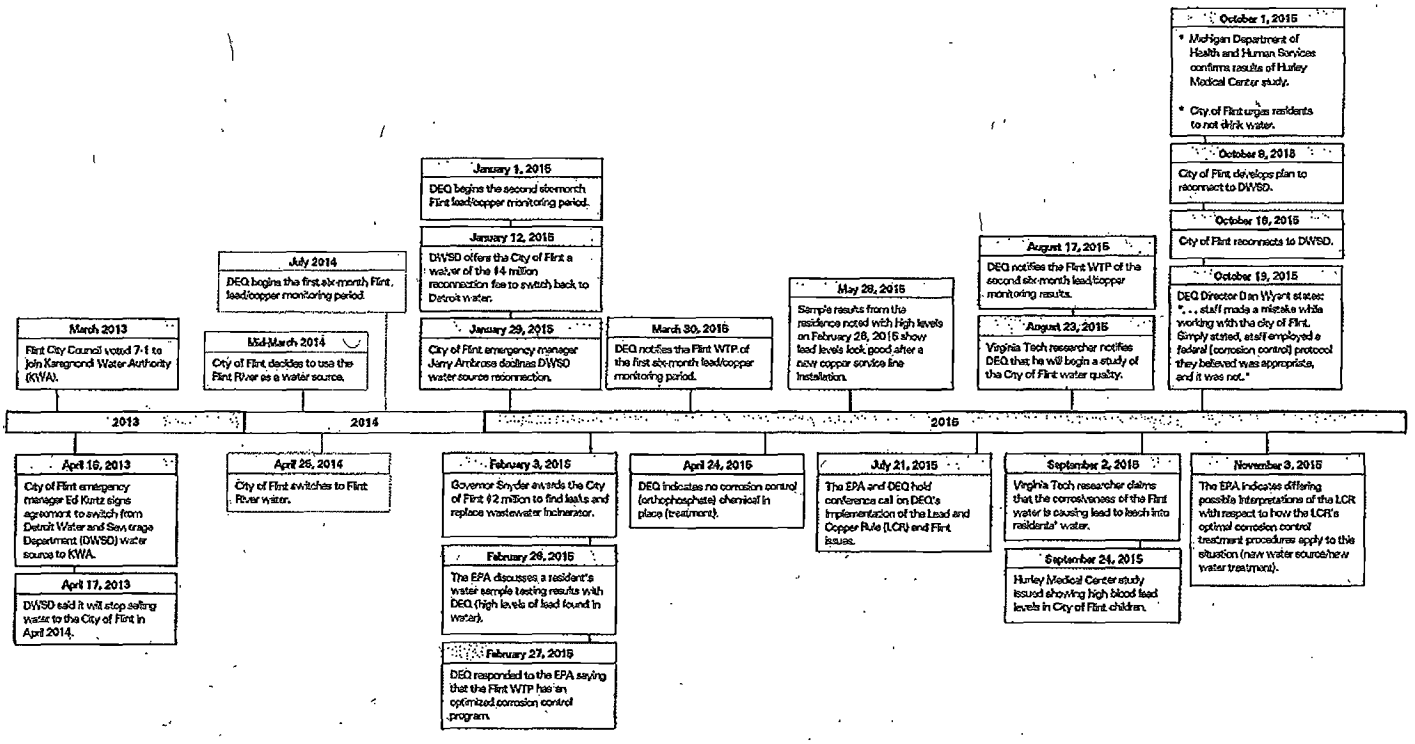
This chart expands on Exhibit #1 to show a summary by zip code and time of selection within the sampling period. Based on the data obtained during our review, we could not determine if the lateness of selection within the monitoring period affected the appropriateness of the sample items.



Source: The OAG prepared this chart using data obtained from DEQ.

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Flint Water Review Time Line (Exhibit #5)



Source: The OAG prepared this time line using data (e-mails, meeting notes, and letters) obtained from DEQ, newspaper and press release articles, the Flintwaterstudy.org, and the Hurley Medical Center survey results.

FLINT WATER EVENTS TIMELINE

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
Pre-1967	Flint Water Treatment Plant in operation using Flint River for drinking water	1
Post-1967	Flint switched to Detroit Water and Sewerage Department for drinking water	None
January 2006	Discussions regarding Karegnondi Water Authority, *Preliminary Long-Term Water Supply for Genesee County*	2
June 25, 2009 September 2009	*Lake Huron Water Supply Study* *Karegnondi Water Authority* Executive Summary and Preliminary Engineering Report	3
March 2013	*Analysis of the Flint River as a Permanent Water Supply for the City of Flint*; Prepared for: City of Flint dated July 2011	4
April 2013	Flint notifies Detroit Water and Sewerage Department of contract discontinuation and joins the Karegnondi Water Authority	5
April 2013	Detroit Water and Sewerage Department sets termination of Flint water service contract to April 17, 2014	6
June 2013	Flint notifies the Department of Environmental Quality of intent to operate Flint Water Treatment Plant full time using Flint River for drinking water	7
April 2014	The Michigan Department of Environmental Quality issues Flint Water Treatment Plant construction permits for full time operation enhancements W141025 and W141026	9
May 2014	Flint stops purchasing Detroit Water and Sewerage Department water. Starts using the City of Flint Water Treatment Plant and Flint River for drinking water	10
August 2014	Flint *E. coli* bacteria violation, Localized System Boil Water Advisory	11
September 2014	Disinfection Byproducts compliance communication; the Michigan Department of Environmental Quality requests preemptive Operational Evaluation	12
September 2014	Flint Total Coliform Bacteria violation, Localized System Boil Water Advisory	13

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
October 2014	General Motors announces decision to stop using Flint River as source for production water	14
December 2014	Disinfection Byproducts quarterly violation begins	15
December 31, 2015	1st 6-month round of lead and copper monitoring ends. Results due from Flint to Michigan Department of Environmental Quality on January 10, 2015	None
January 21, 2015	City of Flint Public Meeting regarding disinfection byproducts and bacteria	17
February 26, 2015	E-mail from United States Environmental Protection Agency to Michigan Department of Environmental Quality regarding elevated lead sample	18
February 27, 2015	E-mail from United States Environmental Protection Agency to Michigan Department of Environmental Quality inquiring about Optimized Corrosion Control Treatment	19
February 27, 2015	Michigan Department of Environmental Quality response to United States Environmental Protection Agency email with statement regarding optimized corrosion control program	20
March 5, 2015	2nd Disinfection Byproducts quarterly violation notice	21
March 30, 2015	Michigan Department of Environmental Quality notifies Flint of Lead/Copper Monitoring Results.	16
April 3, 2015	Long Term 2 Enhanced Surface Water Treatment Rule Letter	22
April 6, 2015	Flint proposes installation of Granular Activated Carbon Filter media to reduce disinfection byproducts	23
April 23, 2015	United States Environmental Protection Agency e-mail to Michigan Department of Environmental Quality regarding corrosion control treatment	24
April 24, 2015 May 1, 2015	Michigan Department of Environmental Quality responds to United States Environmental Protection Agency regarding corrosion control treatment	25

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
April 27, 2015	United States Environmental Protection Agency provided bottles to 212 Browning for lead/copper analyses	26
May 6, 2015	Lead service line replaced at 212 Browning. United States Environmental Protection Agency on-site	27
May 28, 2015	Internal United States Environmental Protection Agency e-mail regarding results at 212 Browning	29
June 9, 2015	3rd Disinfection Byproducts quarterly violation notice	30
June 10, 2015	Semi-Annual Conference call with United States Environmental Protection Agency	31
June 30, 2015	E-mail from United States Environmental Protection Agency scheduling conference call on July 21, 2015 regarding elevated lead result and concerns regarding corrosion control	32
June 30, 2015	2nd 6-month round of lead and copper monitoring ends. Results due from Flint to Michigan Department of Environmental Quality on July 10, 2015	None
July 9, 2015	Michigan Department of Environmental Quality informed that United States Environmental Protection Agency draft internal memo is on ACLU website	33
July 14, 2015	Michigan Department of Environmental Quality issues construction permit to Flint for Granular Activated Carbon filter media W151055	34
July 21, 2015	Conference call with United States Environmental Protection Agency (Lead and Copper Rule implementation and Flint) during which it informs Michigan Department of Environmental Quality its interpretation of Lead and Copper Rule	35
July 24, 2015	Michigan Department of Environmental Quality e-mail and draft letter 90th percentile lead determination = 11 parts per billion and City of Flint requirement to add corrosion control treatment	36

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
July 28, 2015	Michigan Department of Environmental Quality received blood lead level information from Michigan Department of Health and Human Services indicating that results since the switch to the Flint River are consistent with past years seasonal variations	37
August 4, 2015	Meeting with city representatives at Governor's office	38
August 17, 2015	Michigan Department of Environmental Quality notifies Flint of lead/copper monitoring results and requires City to install corrosion control treatment	39
August 23, 2015	Michigan Department of Environmental Quality notified by an external party that a water quality study was about to begin in Flint	40
September 2, 2015	Disinfection Byproducts return to compliance	43
September 11, 2015	United States Environmental Protection Agency e-mail confirming that Michigan Department of Environmental Quality was never sent the draft June 24, 2015 memo	44
September 21, 2015	Meeting with Congressional representatives, legislators, United States Environmental Protection Agency and Michigan Department of Environmental Quality to discuss issues with water quality in Flint	45
September 22, 2015	Meeting/Conference call with Michigan Department of Health and Human Services, Genesee County Health Department, and Michigan Department of Environmental Quality to discuss lead education/outreach	46
September 24, 2015	Hurley Children's Hospital data reveals elevated blood lead levels in Flint children	47
September 24, 2015	Michigan Department of Health and Human Services response affirms State blood lead level data is more comprehensive than Hurley Hospital data	None

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
September 25, 2015	Flint issues Lead Advisory regarding drinking water	48
October 1, 2015	State Chief Medical Officer confirms Hurley blood lead level data	None
October 1, 2015	Genesee County Health Department issues "Do Not Drink" Advisory	49
October 2, 2015	Michigan Department of Environmental Quality and Michigan Department of Health and Human Services press conference. Governor's Flint Action Plan announced.	50
October 2, 2015	Genesee County Health Department school screening water samples collected for lead analysis	51
October 8, 2015	Governor Press Conference: Flint to reconnect to Great Lakes Water Authority/Detroit Water and Sewerage Department	52
October 15, 2015	State Legislature authorizes a $9 million to assist the City of Flint to pay for the return to the Detroit water system and to fund staff at schools to gauge lead exposure	None
October 16, 2015	First weekly coordination meeting held between the City of Flint and state agencies	None
October 16, 2015	Michigan Department of Environmental Quality meets with Flint Schools Superintendent and Genesee County Health Department	None
October 16, 2015	Flint switches back to Detroit Water and Sewerage Department for water	53
October 21, 2015	Governor Snyder announces formation of Flint Water Task Force to complete an After-Action Review	None
October 28, 2015	Michigan Department of Environmental Quality issues construction permit for additional corrosion control treatment W151104	54
October 30, 2015	Michigan Department of Environmental Quality letter to Flint regarding corrosion control treatment operation	55

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
November 3, 2015	United States Environmental Protection Agency Memorandum regarding "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems"	56
November 4, 2015	United States Environmental Protection Agency Memorandum regarding "Transmittal of Final Report – High Lead at Three Residences in Flint, Michigan"	57
Mid-Late 2016	Planned connection to Karegnondi Water Authority (Lake Huron water to Flint Water Treatment Plant)	None

FY 2016 SUPPLEMENTAL BUDGET REQUEST

Flint Water FY 2016 Supplemental Budget Request

1. $1 Million for Filters

The $1 million for filters will be used to purchase filters for households in Flint that do not qualify for assistance under any of the DHHS assistance programs. Filters for those residents will be paid for out of funding already in place in DHHS' budget. Each filter is $20 and they were ordered in bulk through Home Depot. Filters are being distributed through local public health departments, with documentation filed for each filter handed out.

2. $6 Million for switch from Flint River to DWSD

The City of Flint estimates it will cost the City an additional $1.3 million per month to use DWSD instead of the Flint River. The State and the City agreed to split the cost through June 2016, when the new Karegnondi Water Authority will be completed and Flint will switch to that water source. ($1.3 million for 9 months)

3. $1.35 Million for resources to do community Lead Exposure Testing

DEQ, DHHS and LARA are assembling a team to go into schools, childcare facilities, and other high lead exposure health risk locations to test and follow up on lead exposure.

4. $1 Million for evaluating sample results at the State Lab

The new testing protocols for schools will require each faucet in the school to be tested and evaluated at the State lab. In addition, lead exposure testing in homes will result in tens of thousands more samples that will be need to processed. Each sample costs $26 to process.

Total Ask: $9.35 Million, $7.15 GF

DEQ'S 18 POINT PARTNERING PLAN

DEQ's 18 Point Partnering Plan

1. **After Action Plan (FAQ) will be ready by noon November 16, 2015**
   - First version complete – updated as needed

2. **School Test Data**
   - School reports to be expedited
   - Steve Busch creates summary reports
   - George Krisztian creates summary spreadsheet

3. **Blood exposure**
   - DHHS is lead on providing data

4. **Meeting with Mayor Karen Weaver**
   - Harvey Hollins lead – Dan Wyant, Jim Sygo and George Krisztian to attend

5. **Messaging our Partnering Plan**
   - Provide ongoing public updates regarding Governor's 10 point plan
   - Continue emphasis on the availability of free testing for Flint residents
   - OEA to direct the Public to the "Flintwater" website

6. **Sampling Protocol**
   - Establish alignment with EPA Region 5 on sampling protocol

7. **Lead service line replacement**
   - Expand RLF directed at lead service line replacement
   - Amy Epkey, Maggie Pallone and Sonya Butler

8. **Partner with EPA**
   - Jim Sygo → Bob Kaplan
   - Dan Wyant → Susan Hedman
   - Mike Prysby and Steve Busch → Darren Lytle and Mike Schock
   - George Krisztian → Tom Burke
   - ODWMA Staff → EPA Region 5 Staff (Jennifer Crooks and Tom Poy

9. **Meet with Mott Foundation to discuss Lead Service Line Identification Study**

10. **Lead Education Program**
    - DHHS is the lead on Lead Education Program

11. Moving KWA forward

- Proactive meetings with KWA

12. Participate actively with Technical Advisory Council

13. Utilize Joan Rose and MSU water expertise

14. Public Outreach

- Mayor Karen Weaver
- Genesee County Health Department
- Drs. Lawrence Reynolds, Eden Wells and Matthew Davis
- Ministers
- Land Bank
- Legislators
- Citizens

15. Outreach to schools

- EPA guidance on testing
- Work with state superintendent
- ODWMA Staff to work on Literature

16. Make recommendations to EPA about LCR

17. Compliance Communication letter sent November 9, 2015

- Wait until after Dec 30th

18. Enhance Coordination with Health Officials regarding personal health notifications of drinking water issues.

EPA COMMUNICATION ON LEAD AND COPPER RULE

Thelen, Mary Beth (DEQ)

From:	Wyant, Dan (DEQ)
To:	Hedman, Susan
Subject:	RE: talking points

From: Hedman, Susan [mailto:hedman.susan@epa.gov]
Sent: Thursday, October 01, 2015 7:27 PM
To: Wyant, Dan (DEQ)
Subject: RE: talking points

Further to our conversation, please note that lead and copper monitoring is used to determine:

1) Whether corrosion control is optimized. Under 141.81(b)(3), a water system is deemed to have optimum corrosion control if it submits results of tap water monitoring that demonstrates for 2 consecutive six-month periods that the 90th percentile level is below 5 ug/L (ppb). Because Flint exceeded this level, the City is required to implement corrosion control – as noted in MDEQ's August 17th letter to the City of Flint which states: "Since the City did not meet these criteria in both the July–December 2014, and January-June 2015, sampling periods, the City must now recommend a treatment to fully optimize corrosion control treatment . . . ."

2) Whether the lead action level (15ug/L) has been exceeded. Under 141.84(a), systems that fail to meet the lead action level in tap samples after installing corrosion control treatment must replace lead service lines – 7% of the lead service lines in its distribution system.

From: Wyant, Dan (DEQ) [mailto:WyantD@michigan.gov]
Sent: Thursday, October 01, 2015 5:02 PM
To: Hedman, Susan
Subject: Fwd: talking points

Talking points. I will make the adjustment you and I talked about. Thanks for your help.

Sent from my iPhone

Begin forwarded message:

> **From:** "Tommasulo, Karen (DEQ)" <TommasuloK@michigan.gov>
> **Date:** October 1, 2015 at 4:27:53 PM EDT
> **To:** "Pallone, Maggie (DEQ)" <PalloneM@michigan.gov>, "Minicuci, Angela (DHHS)" <MinicuciA@michigan.gov>, "Eisner, Jennifer (DHHS)" <EisnerJ@michigan.gov>, "Hertel, Elizabeth (DHHS)" <HertelE@michigan.gov>, "Wurfel, Brad (DEQ)" <WurfelB@michigan.gov>, "Wurfel, Sara (GOV)" <WurfelS@michigan.gov>, "Murray, David (GOV)" <MurrayD1@michigan.gov>, "Thelen, Mary Beth (DEQ)" <THELENM2@michigan.gov>, "Wyant, Dan (DEQ)" <WyantD@michigan.gov>, "Paciorek, Josh (GOV)" <PaciorekJ@michigan.gov>, "Lasher, Geralyn (DHHS)" <lasherg@michigan.gov>
> **Subject: talking points**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF WATER

MAY 03 2016

MEMORANDUM

SUBJECT: Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems

FROM: Peter C. Grevatt, Director
Office of Ground Water and Drinking Water

TO: EPA Regional Water Division Directors, Regions I-X

This memorandum addresses certain concerns raised about the application of the 1991 Lead and Copper Rule, specifically the requirements pertaining to maintenance of optimal corrosion control treatment, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. These concerns have been raised most recently in regard to the drinking water system in Flint, Michigan, where the water system was disconnected from the Detroit Water and Sewerage Department, which provided corrosion control treatment for Lake Huron source waters, and instead began distributing water from the Flint River. This type of situation rarely arises and the language of the LCR does not specifically discuss such circumstances. After reviewing the rule with our Office of General Counsel, it appears that there are differing possible interpretations of the LCR with respect to how the rule's optimal corrosion control treatment procedures apply to this situation, which may have led to some uncertainty with respect to the Flint water system. This memorandum clarifies how the LCR applies to this situation and eliminates the uncertainty for water systems and primacy agencies that may face these circumstances in the future.

It is important for large systems and primacy agencies[1] to take the steps necessary to ensure that appropriate corrosion control treatment is maintained at all times, thus ensuring that public health is protected. This memorandum focuses on those steps and clarifies, on a prospective basis, how EPA interprets the LCR corrosion control requirements and how primacy agencies should apply these requirements to large public water systems before, during and after making a significant change in source water, including switching from purchased water to a new source.

Under the LCR, all large systems (those serving more than 50,000 persons), whether purchasing water or not, must have completed a series of steps to either optimize the corrosion control treatment or be deemed to have optimal corrosion control treatment (OCCT) by 1998. 40 CFR 141.81. Key steps for

[1] The term "primacy agency" refers to the State, tribe or U.S. Environmental Protection Agency regional office having jurisdiction over, and primary enforcement responsibility for, a given public water system.

optimizing corrosion control include monitoring, corrosion control studies, installation of treatment, follow-up sampling and specification by the primacy agency of water quality parameters (WQPs) for monitoring corrosion control. The LCR requires any large system that has met the OCCT requirements through the installation of corrosion control treatment to continue operating and maintaining the treatment and to continue meeting the WQPs established by the primacy agency. 40 CFR 141.81(b) and 141.82(g). Systems deemed to have OCCT without the installation of corrosion control treatment are not subject to this requirement. However, they are required to notify the primacy agency in writing of any upcoming changes in treatment or source and request that the primacy agency modify its determination of the OCCT and WQPs applicable to the system. The primacy agency must then review and approve the change and designate OCCT and WQPs prior to its implementation by the system. 141.81(b)(3). Similarly, systems subject to reduced monitoring or monitoring waivers must notify the primacy agency of any upcoming changes in treatment or source and the primacy agency must subsequently review and approve it. EPA recommends that systems that are not subject to a notification requirement also notify the primacy agency prior to the addition of a new source or treatment and request the primacy agency to modify its determination of the optimal corrosion control and WQPs applicable to the system.

Due to the unique characteristics of each PWS (e.g., source water, existing treatment processes, distribution system materials) it is critical that public water systems, in conjunction with their primacy agencies and, if necessary, outside technical consultants, evaluate and address potential impacts resulting from treatment and/or source water changes. It is also critical for public water systems to conduct ongoing monitoring to ensure compliance with OCCT prior to, during and after a source or treatment change. The rearrangement of a system's existing configuration may trigger the need for OCCT adjustments and establishment of appropriate WQPs. Primacy agencies should work with systems that plan to disconnect from a supplier that had installed corrosion control treatment to determine the OCCT for the new source and establish WQPS for that treatment instead of using the OCCT and WQPs established for the previous source. This will allow a system that ceases to purchase treated water to stay in compliance with any applicable requirements pertaining to OCCT and ensure protection of public health during and after the change in source. EPA has developed a guidance manual[2] specifically focusing on evaluation of corrosion control treatment options and optimization of full-scale treatment to assist water systems and primacy agencies with these efforts. EPA is currently preparing an updated version of the manual, which we anticipate will be released in February 2016.

The key to identifying and mitigating potential problems is to ensure effective collaboration between the public water system and the primacy agency. Corrosion control treatment can come in many forms. For this reason, it is important to conduct a system-wide assessment prior to any source water and/or treatment modifications and to identify existing or anticipated water quality, treatment or operational issues that may interfere with or limit the effectiveness of corrosion control treatment optimization or re-optimization.

If you have additional questions or concerns, please contact me or have your staff contact Maria Lopez Carbo, Chief of the Protection Branch, in the Office of Ground Water and Drinking Water, at lopez-carbo.maria@epa.gov.

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[2] U.S. Environmental Protection Agency. *Lead and Copper Rule Guidance Manual, Volume II: Corrosion Control Treatment.* Office of Water. EPA 811-B-92-002. 1992. Available at: http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=91019DM4.txt.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGIONAL ADMINISTRATOR
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

MEMORANDUM

DATE: November 4, 2015

SUBJECT: Transmittal of Final Report - High Lead at Three Residences in Flint, Michigan

FROM: Tinka G. Hyde
Water Division Director

TO: Jim Sygo
Deputy Director
Michigan Department of Environmental Quality

Howard Croft
Director of Flint Public Works

Enclosed please find for your file a final redacted version of a report prepared by EPA Scientist, Miguel Del Toral, regarding lead in drinking water at three residences in Flint, Michigan. The redactions remove personally identifiable and medical information. This report has been finalized and is also being provided to the National Drinking Water Advisory Council (NDWAC) for discussion during their upcoming meeting on November 17-19, 2015. We understand you saw an earlier version of this document; and note that most of the recommendations in that interim report are already being implemented (e.g., the City of Flint has switched back to Detroit water; filters have been provided to residents; and additional corrosion control treatment will be implemented).

The final report contains important new information indicating that physical disturbances of lead service lines can dislodge the protective coating that prevents lead from leaching into drinking water. The final report recommends notifying residents about the potential risks of increased lead levels in drinking water when work is undertaken that may disturb lead service lines.

cc: Natasha L. Henderson, City of Flint Administrator

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High Lead Levels in Flint, Michigan

The purpose of this report is to present the findings of activities conducted in response to high lead levels in drinking water reported to the United States Environmental Protection Agency Region 5 Office (EPA) by a resident in the City of Flint, Michigan.

Background Information

Prior to April 30, 2014, the City of Flint purchased water from the City of Detroit. On April 30, 2014, the City of Flint switched from utilizing purchased water from Detroit to a new water source, the Flint River. Subsequent to the change in source water, the City of Flint experienced a number of water quality issues resulting in violations of National Primary Drinking Water Regulations (NPDWR) including acute and non-acute Coliform Maximum Contaminant Level (MCL) violations and Total Trihalomethanes (TTHM) MCL violations (see Appendix A).

Beginning in January 2015, [redacted], a resident of Flint, called the Flint Water Department (FWD) regarding the water quality in her home. In response to the initial and subsequent calls, the FWD visited the [redacted] home on a number of occasions and also collected tap water samples. [redacted] also contacted EPA regarding these same water quality issues and medical issues she believes are associated with the water quality in Flint.

Following initial calls on the general water quality, on February 26, 2015, [redacted] contacted EPA regarding high lead levels found in her drinking water by the City of Flint. The result of the initial lead in water sample collected by the City of Flint on February 18, 2015 from the [redacted] home was 104 µg/L and the level of iron in the water exceeded the capability of the instrument to measure (>3.3 mg/L). On February 26, 2015, upon receiving the lead results from [redacted], the EPA contacted the Michigan Department of Environmental Quality (MDEQ) regarding the high lead result. The MDEQ advised that the City of Flint collect a follow-up sample for lead at the [redacted] home.

On March 3, 2015, the City of Flint collected a follow-up sample for lead at the [redacted] residence and the result of this second sample was 397 µg/L[1]. Subsequent to receiving her second result, EPA spoke to [redacted] via phone on March 19, 2015, and the following information was provided by [redacted]:

- The [redacted] home is a HUD home which was gutted and renovated in 2011. All existing plumbing had been removed and the [redacted] installed plastic plumbing.
- Due to high iron levels in the tap water, the [redacted] installed an iron filter downstream of the service line inlet into the home.
- [redacted] indicated that at this time they are not drinking the water or using it for cooking. She stated that her child's blood lead level (BLL) was originally at [redacted] in 2012 and that a more recent test showed it had increased to [redacted], but she noted that

[1] *Note: A third water sample had been collected on April 2, 2015, but the results had not been provided to the [redacted] at the time the interim report was written. The third lead in water sample result was 707 µg/L*

the BLL testing was done well after the child had stopped drinking the water and may have been higher during the time the child was consuming the water.

- Water samples collected by the City of Flint from her home were collected from the kitchen tap after the iron filter was physically removed.
- The Flint Water Department (FWD) informed [redacted] that her service line does not connect to the water main in front of her home as is typically the case for most homes.
- On March 18, 2015, City of Flint personnel went to the [redacted] home to locate the external shut-off valve in conjunction with the planned replacement of the [redacted] service line and were unsuccessful. Eventually it was discovered that the external shut-off valve was located at the corner of [redacted] and Bryant Street, two houses down from the [redacted] home.

As part of EPA's effort to respond to [redacted] concerns regarding her water results, EPA contacted the FWD. The following information was provided to EPA by the FWD:

- [redacted] home is one of the first homes built on the block and the service line runs for approximately 50-60 yards, connecting to the water main on Bryant Street which runs perpendicular to [redacted] (see Appendix A).
- Flint has a large number of lead service lines, so it would not be surprising to find that this is a very long lead line.
- The first sample from the [redacted] home was collected with the iron filter in place, and the second was with the iron filter physically removed. The iron filter was located just after the water meter.
- [redacted] showed FWD a video of her son 10 minutes after taking a bath, and that he had a full body rash in the video.

It was a common practice in the early 1900s to purchase large parcels of land and later subdivide them. Since service lines are typically run from the water main to the nearest location on a property and it is possible that the [redacted] home may have originally been part of a larger parcel of land that encompassed the two homes that now exist adjacent to the [redacted] home and was subsequently divided, leaving the original home connected to the same service connection and water main, while the newer homes were connected to a more recent water main installed along [redacted].

Based on a suspected conflict of interest at the healthcare facility that originally tested her son's BLL, [redacted] took her son to a different healthcare facility to have his blood lead tested again. On April 1, 2015, [redacted] provided EPA with a copy of her child's blood lead testing performed on March 27, 2015, showing a higher BLL ([redacted]) than the original test.

Due to the persistently high lead results, the FWD shut off the water service to the [redacted] home on April 3, 2015. Per agreement between the FWD and [redacted], her home was then connected to her neighbor's home via a garden hose, from one hose bib to another. This was understood to be a temporary measure until the [redacted] service line could be replaced. The [redacted] used this water connection only for bathing, washing dishes and washing clothes.

At the invitation of [redacted], EPA visited the [redacted] home on April 27, 2015, and reviewed the internal plumbing and information provided by [redacted], including water samples and spent filter cartridges. During this visit, EPA observed that the internal pipes, valves and connectors at the [redacted] residence were made of CPVC plastic, approved by NSF for potable drinking water applications, with a few minor metal connectors. A review of the treatment units in the home by EPA found that there was no iron filter in the home as had previously been thought. The only active treatment device in the home was a whole-home sediment filter which utilizes NSF certified Whirlpool WHKF-WHWC cartridge filters for sediment removal and taste/odor. There was also a non-functioning 'Water Resources International Hydro-Quad Commercial Water Processor' which was bypassed (see Appendix A).

At the request of [redacted], Dr. Marc Edwards at Virginia Tech provided sampling instructions to [redacted] for collecting a series of samples from her home. As part of the instructions, on the night of April 27, 2015, the water at the [redacted] residence was turned back on temporarily and the kitchen tap was flushed for 25 minutes at low flow prior to letting the water sit overnight. A series of sequential samples were collected the following morning (April 28, 2015) and sent to Dr. Edwards for analysis.

Dr. Edwards provided [redacted] with the results of the analyses and also shared the results with EPA on May 5, 2015, along with information regarding other chemical parameters tested (see Appendix B). In addition to very high lead levels in all sample results, the analytical data shows a correlation between lead and phosphate as well as lead and aluminum in all samples. On April 24, 2015, EPA had learned that Flint did not have corrosion control treatment in place and also learned that Flint was using ferric chloride as a coagulant. Consequently, as the City of Flint is not utilizing phosphate or alum as treatment chemicals since the source switch, the results indicate that it is likely that the phosphate and aluminum were being released from the scale within the distribution system network. This scale would have formed on the inside of the pipes in Flint during the time when the City was purchasing water from Detroit, as Detroit utilizes orthophosphate for corrosion control and alum as a coagulant in their water filtration process.

Research conducted by EPA on lead content in pipe scales has shown that scales which form on the inside of lead pipes can be released or dislodged into the water and may contain a high percentage of lead (Appendix C). Although the results received from Virginia Tech were indicative of the presence of a lead service line, the FWD indicated that no records existed to confirm whether any portion of the service line connecting to the [redacted] home was made of lead. However, given the high lead levels found, it was presumed that at least a portion of the service line was likely made of lead. In the course of following up on the high lead at the [redacted] home, additional sample results provided to EPA from other residences in Flint also showed high lead levels.

Primarily from a public health standpoint, but also from a research standpoint, it was important to try to find out what the cause of these very high lead levels might be. EPA Region 5, EPA's Office of Research and Development and others have been working

together collaboratively to better understand lead release mechanisms from lead service lines in anticipation of upcoming revisions to the Lead and Copper Rule (LCR) and as part of a collaborative effort in EPA Region 5 to study potential options for optimizing phosphate treatment to control lead in water and the need to reduce phosphorus discharges into the environment. Since the [redacted] service line was scheduled for replacement on May 6, 2015 and the presumption was that at least a portion of the service line was lead, EPA visited the [redacted] home on the day of the service line replacement to gather information and service line pipe samples that could provide additional information as to how lead levels could get as high as they did in this case.

The original service line to the [redacted] home was disconnected and two service line pipe segments from this service line were extracted on May 6, 2015. Additional tap water samples were collected also from two homes on Bryant Street that were connected to the same water main as the [redacted] home (Appendix A). The samples were collected from these homes as they had more typical service line lengths as compared with the [redacted] home. During the same visit, patches of asphalt were also noted along the curb on Browning Avenue, indicating that excavation had occurred. These patches, which were in proximity of the [redacted] service line in the parkway (see Appendix C) may be one of the potential factors contributing to the high lead at the [redacted] home, as it has been shown that physical disturbances to pipes can dislodge the scales within those pipes.

The two service line segments that were extracted were subsequently identified as galvanized iron pipe. Analyses conducted by Virginia Tech on the extracted portions of the pipe indicate that the galvanized iron pipe was fairly typical in terms of composition (see Appendix C). The galvanized iron portion ran from inside the [redacted] home to the external shut-off valve at the corner of [redacted] and Bryant Street. The remainder of the [redacted] original service line from the shut-off valve to the water was made of lead.

Although the service line had been disconnected from the [redacted] home, it was not possible to retrieve a segment of the lead portion of the service line as it was beyond the shut-off valve which had been closed and left in place. Following the disconnection of the original service line, a new service line made of copper was installed from the [redacted] home to the water main in front of the home on [redacted]. Subsequent to the replacement of the service line at the [redacted] home, water samples were also collected from the [redacted] home and sent to the EPA Chicago Regional Laboratory for analysis. In all three homes, the sequential samples were collected using standard protocols used in prior sequential sampling efforts to capture water samples reflecting lead levels from the kitchen tap to the water main. Two additional samples were collected from the water heater drain valve at the [redacted] home to determine if lead deposits had accumulated in the water heater, and a final sample was collected from the bathroom tap. The sequential sampling results indicate that the service line replacement eliminated the high lead levels and that no residual lead had accumulated within the plastic plumbing of the [redacted] residence, which was a potential concern and possibility based on prior research. One of the two samples collected from the [redacted] hot water heater had high lead (32 µg/L), likely from lead particulate that had accumulated in the tank, and the sample collected from the bathroom was 5.5 µg/L.

The sequential samples collected from the two homes on Bryant Street had differing results. At the first home (Site 2), a series of 15 sequential one-liter samples were collected and the results are indicative of a service line that does not contain any portion that is made of lead. Consequently the lead results were low overall for samples representative of the service line. The first sample in the sequential sampling series was the highest, which potentially indicates the presence of leaded brass in the faucet or underlying sink fixtures. Some leaded brasses manufactured prior to the 2011 lead-free law have been shown to release high levels of lead in certain water qualities. Leaded-solder was ruled out as the home plumbing consisted of galvanized iron pipe, and it is presumed that if the galvanized iron pipe were contributing the higher lead, the lead levels would be more consistent in all 15 samples.

At the second home (Site 3), a series of 15 sequential one-liter samples were collected from the kitchen tap and the results indicated that there were no significant sources of lead within the home plumbing but that a portion of the service line is likely made of lead, as indicated by the characteristic peaking of lead levels in the liters capturing water from the service line between the property and the water main, where the portions of many service lines in Flint are made of lead.

All three sets of sequential samples were analyzed for lead, copper, iron, phosphorus and cadmium. In contrast to the samples analyzed by Virginia Tech from the [redacted] home prior to the removal of the original service line, no phosphorus was present in the sequential samples at the [redacted] home following the replacement of the service line. In addition, no phosphorus was detected in the sequential samples from the two homes on Bryant Street. These results indicate that the source of high lead, aluminum and phosphorus in the analyses conducted by Virginia Tech was likely dislodged or disintegrated scale from within the [redacted] original service line.

The sequential sampling results from the [redacted] home before and after service line replacement, as well as the results from the two homes on Bryant Street are included in Appendix B.

Although relative contributions cannot be determined, there are a number of factors that could have contributed to the high lead levels found at the [redacted] home as follows:

1) Corrosiveness of water and lack of mitigating (corrosion control) treatment

The corrosiveness of the water and the absence of mitigative treatment to control lead release are well known factors that can contribute to high lead release.

2) Presence of a lead service line

Lead service lines are the largest source of lead, when present, and can contribute up to 75 percent of the total mass of lead released into the water. The portion of the original service line from the water main to the external shut-off valve at the corner of [redacted] and Bryant Street, estimated to be approximately 25 feet in length, was found to be a lead

pipe. In addition, studies have also shown that the scales within galvanized iron pipe downstream of lead pipe segments can be 'seeded' with lead from the lead portion of the service line. The [redacted] service line was much longer than most typical service lines which would allow accumulation of a greater total mass of scale within the pipe.

3) Physical disturbances

A recent EPA study indicates that physical disturbances in proximity to lead service lines can cause the dislodging of the protective scales from within the service lines. The photograph in Appendix C shows the scale that was dislodged from inside a lead service line during routine maintenance work in another city due to a physical disturbance of the line. The dislodged scale and sediment contained a very high concentration of lead. At the time of the EPA visit to the [redacted] home, there were two patches of new asphalt visible on [redacted] along the parkway where the [redacted] original service line was located, indicating recent excavation and possible recent physical disturbances to the [redacted] service line (Appendix C). These potential disturbances were along the galvanized iron section of the service line and as noted above, research has shown that the presence of lead pipe upstream can 'seed' the galvanized iron pipe downstream with lead, which results in an accumulation of lead-bearing scales within the galvanized pipe downstream of the lead portion of the service line. It is reasonable to assume that these physical disturbances to the galvanized iron portion of the service line could therefore result in the same dislodging of scale and sediment as studies have shown can happen with lead service lines.

The street disturbances on [redacted] occurred after the [redacted] moved into the home along the portion of the service line made of galvanized iron pipe. There were no visible signs of disturbance on Bryant Street where the lead portion of the [redacted] service line was situated (see Appendix C). It is likely, given the extremely high lead levels found and the co-occurrence of aluminum, phosphorus and lead, that the long segment of galvanized iron pipe was seeded with lead over the entire length of the pipe and the physical disturbances and other factors such as the water chemistry resulted in the release of large amounts of the high-lead bearing scale and sediment into the water. Virginia Tech also found nearly perfect correlations between the lead in water and markers for galvanized pipe scales including zinc.

Recommendations

As indicated by the results from the [redacted] home and previous EPA work, the presence of lead pipes over many years has likely resulted in the accumulation of lead in the scales within non-lead pipes downstream of the lead pipe and physical disturbances to the leaded or non-leaded portions of the service lines have the potential to release large amounts of scale and sediment that could pose an immediate and acute health hazard to the residents. Consequently, even with corrosion control treatment in place in the future, physical disturbances will be capable of dislodging the high lead-bearing scale and sediment from non-lead pipes as well as lead pipes, as was the case in the earlier EPA study.

Obtaining information on the lead reservoirs in the scales within the lead and non-leaded portions of intact service lines is essential for determining the potential risk to residents

from lead-bearing scale released as lead lines are replaced as well as the risk that may remain following removal of the lead lines, where the non-leaded portions of service lines are left in place.

As the [redacted] service line was very long compared to the length of most typical service lines, it is important to assess the potential risk posed by the scale reservoirs in more typical lengths of service lines by extracting both the leaded and non-leaded portions of service lines which have not been physically disturbed. The service lines chosen for extraction and analysis should be representative of the materials commonly used downstream of the lead pipe (e.g., galvanized iron, copper, plastic). Extraction/handling procedures should be developed by EPA to ensure that damage to the scales from the excavation, extraction and delivery of the service line segments is minimized. Sequential sampling should also be conducted on a representative group of homes with common plumbing materials (e.g., galvanized iron, copper, plastic) to determine the extent to which the lead from the service line has seeded the interior plumbing in homes.

It is also critically important to develop and incorporate ongoing training and public education on the potential for high lead release from the scales as a result of any future physical disturbances to service lines and mitigative actions that residents can take to lower their exposure risk. The training and educational material should be assessed for clarity, meaningfulness, and accessibility by a group of residents and health experts to ensure the effectiveness of the communications.

At a minimum, immediate training and public education on the potential risks posed by physical disturbances to service lines should be developed by communications experts and provided to residents, community groups, elected officials, health departments, pediatricians and gynecologists, water and non-water utilities (gas, electric, cable, etc.), plumbing organizations and contractors. Residents should be notified of scheduled work by water and non-water utilities and informed of the potential risk of increased lead levels due to these disturbances.

Appendix A – Background Information

National Primary Drinking Water Regulations (NPDWR) Violations – City of Flint

Following the switch to the Flint River, the City of Flint experienced a series of NPDWR violations as follows:
Acute Coliform MCL violation in August 2014
Monthly Coliform MCL violation in August 2014
Monthly Coliform MCL violation in September 2014
Average TTHM MCL violation in December 2014
Average TTHM MCL violation in March 2015
Average TTHM MCL violation in June 2015

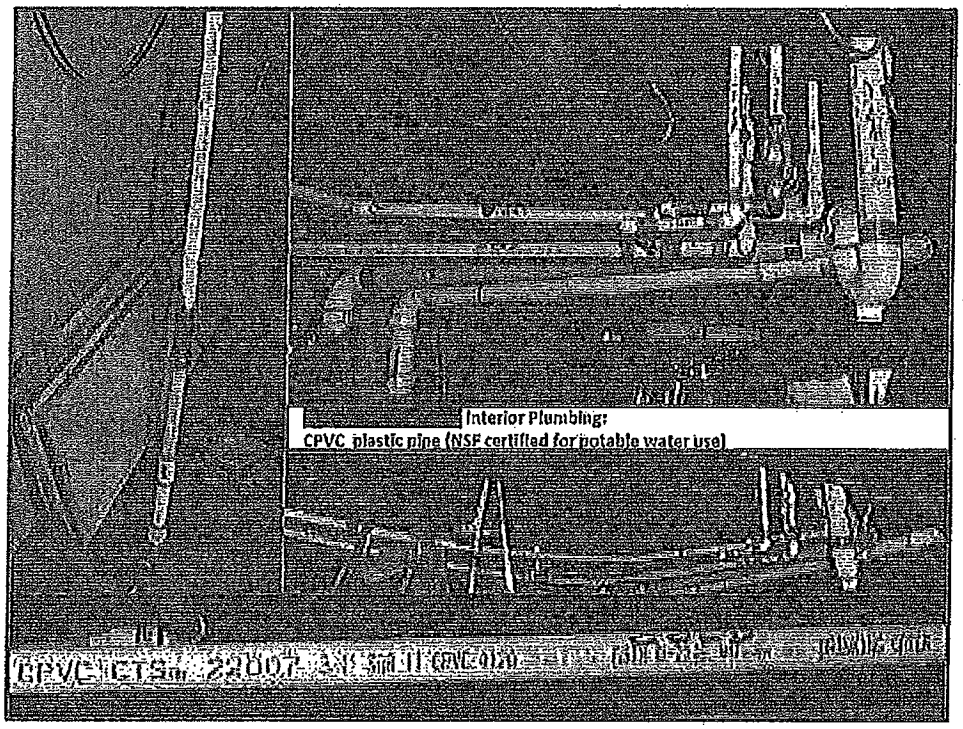
Sampling Sites

The map below shows the three homes that were sampled as provides information on the length of the service lines and the plumbing material. Two portions of the original service line were extracted and analyzed and a third portion was collected from the entry point into the home, but not analyzed.

[map redacted because it shows Personally Identifiable Information]

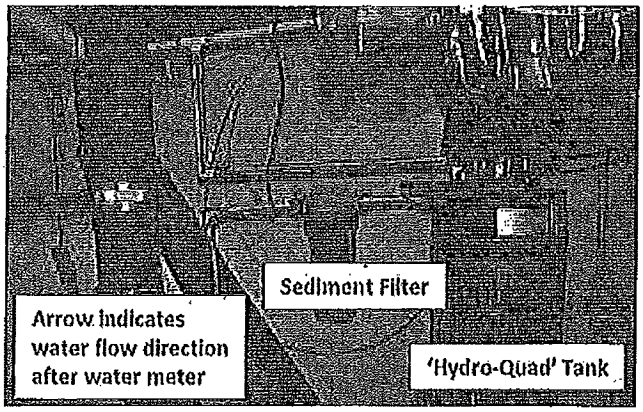
Internal Plumbing – [redacted]

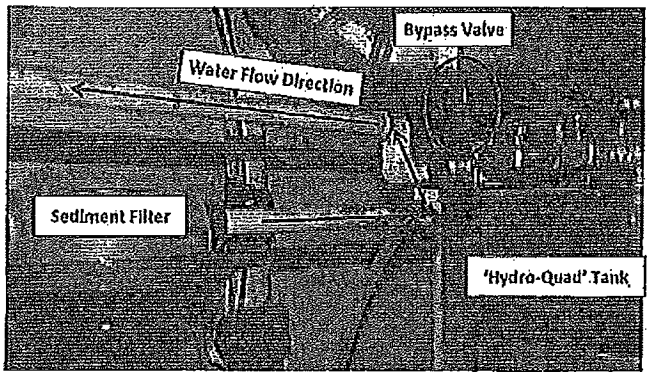
The following pictures were taken at the [redacted] home located at [redacted]. With the exception of a a few minor metallic connectors, all potable water plumbing in the home was found to be CPVC plastic pipe which is NSF-certified for drinking water use.

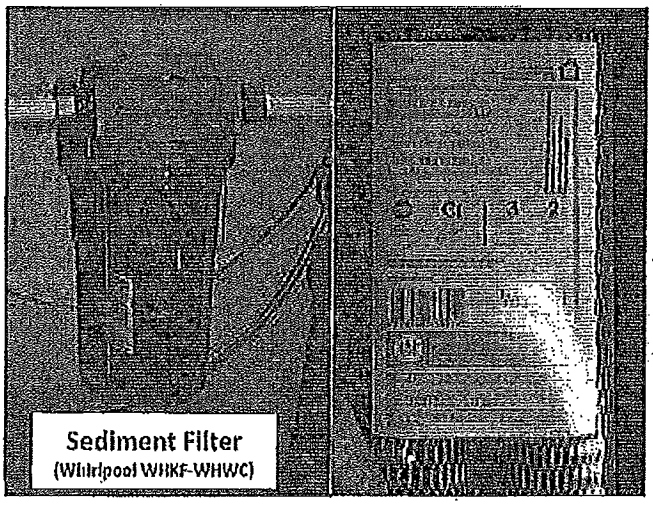


Treatment Units – [redacted]

The [redacted] home has a whole-home sediment filter, as well a non-functioning 'Hydro-Quad Commercial Water Processor' which is bypassed. There was no iron filter in the home as had been previously reported.







Appendix B – Analytical Results

Lead in water sampling results from the [redacted] residence ([redacted])

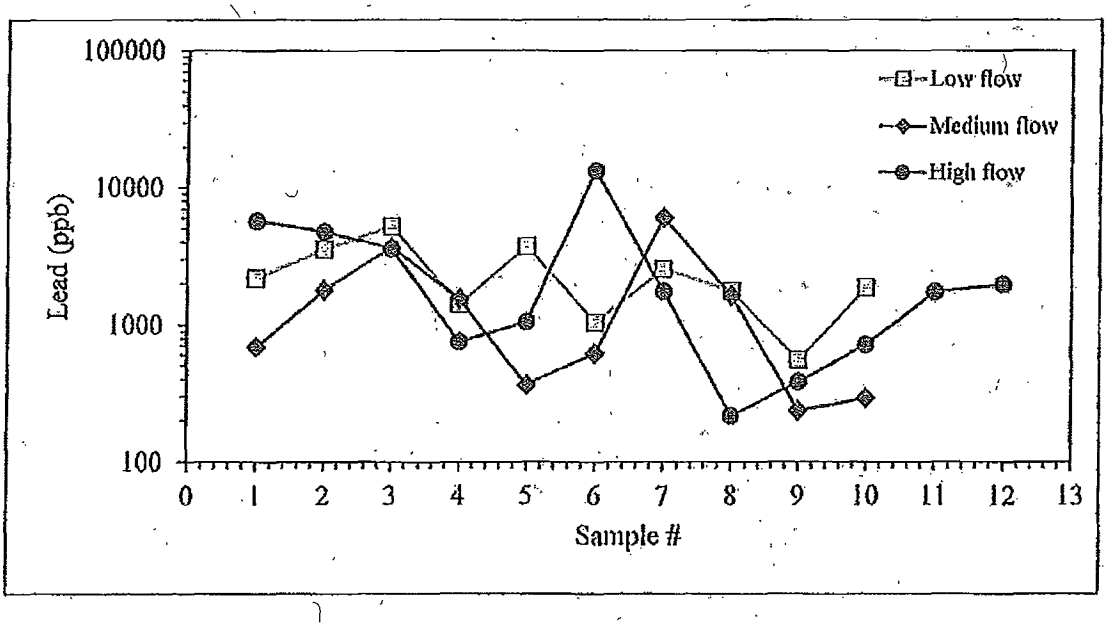
City of Flint Samples

The City of Flint collected water samples from the [redacted] residence and analyzed them for lead. The results for each date are listed below.
February 18, 2015: 104 µg/L
March 3, 2015: 397 µg/L
April 2, 2015: 707 µg/L*

*This sample result had not been provided to the [redacted] at the time the interim report was written.

Virginia Tech Sampling Results (provided courtesy of Virginia Tech)

Samples were collected from the [redacted] home following an extended stagnation period (April 3, 2015 to April 27, 2014) after the water at the [redacted] residence had been shut off. The water was turned back on and three sets of sequential samples were collected on April 28, 2015, at different flow rates (low, medium and high).



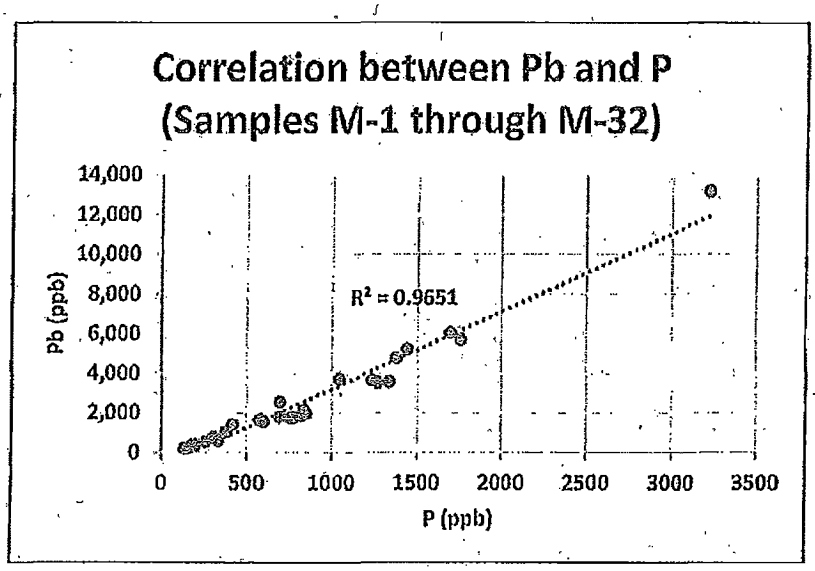
	Low Flow									
	1 L Sample Bottle							125 mL Sample Bottle		
Element (units)	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-21	M-22	M-23
Ag (ppb)	0	0	0	0	0	0	0	0	0	0
Al (ppb)	2,285	4,199	7,683	1,856	5,623	1,422	3,413	1,865	666	2,015
As (ppb)	3.3	3.9	4	2	3.2	2	2.6	3.6	1.9	3.1
Ba (ppb)	31.3	39.8	27.7	21.2	24.2	20.9	22.8	31.3	21.3	32.6
Ca (ppb)	43,150	43,620	43,580	42,590	43,030	42,030	42,440	40,790	41,050	41,460
Cd (ppb)	2.5	4.2	5.7	1.9	3.9	2	2.5	2.2	1.4	2.4
Cl (ppm)	1,206	1,148	1,272	1,178	1,187	1,214	1,218	1,641	1,076	1,044
Co (ppb)	1.1	1.7	0.9	0.4	0.7	0.4	0.5	0.9	0.3	1
Cr (ppb)	2.1	2.5	2.6	1.3	1.9	1.6	1.5	1.8	1.3	1.7
Cu (ppb)	235	355	294	94	146	101	112	180	82	178
Fe (ppb)	3,598	4,928	3,419	1,446	3,029	2,142	1,780	3,096	1,344	3,241
K (ppb)	3,480	3,508	3,445	3,435	3,430	3,391	3,409	3,256	3,319	3,341
Mg (ppb)	10,310	11,910	17,990	11,290	15,470	10,610	12,720	8,861	9,396	9,098
Mn (ppb)	1,734	2,790	1,093	462	703	429	652	1,382	442	1,509
Mo (ppb)	2.3	2.3	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.8
Na (ppb)	17,790	17,860	17,810	17,620	17,650	17,410	17,610	16,960	17,100	17,280
Ni (ppb)	9.8	16	30.7	8.1	23.2	6.2	15.3	6.6	3.7	6.8
P (ppb)	835	1,267	1,441	416	1,040	379	691	773	261	819
Pb (ppb)	2,171	3,550	5,224	1,412	3,735	1,038	2,542	1,759	552	1,857
S (ppm)	28.5	28.7	28.5	28.4	28.5	28	28	26	27	27.1
Se (ppb)	0.2	0	-0.1	0.1	0.2	0	0.3	0	0	0.2
Si (ppb)	3,212	5,281	12,320	4,474	9,401	3,770	6,231	2,619	2,582	2,775
Sn (ppb)	4.6	4.9	6.1	2.2	4.5	2.3	3	2.3	1.5	2.3
Sr (ppb)	129.4	132.3	128.5	125	127.7	125.3	126.1	126.3	125.5	128
Ti (ppb)	3.4	5.8	8.3	2.1	5.8	1.9	3.1	3	1.4	3.1
U (ppb)	1	1.6	2.6	0.8	1.9	0.7	1.2	0.9	0.4	0.9
V (ppb)	13.9	17.5	23.9	9.8	17.6	8.9	13.8	12.2	6	10.8
Zn (ppb)	1,055	1,848	2,731	777	1,890	839	979	746	513	808

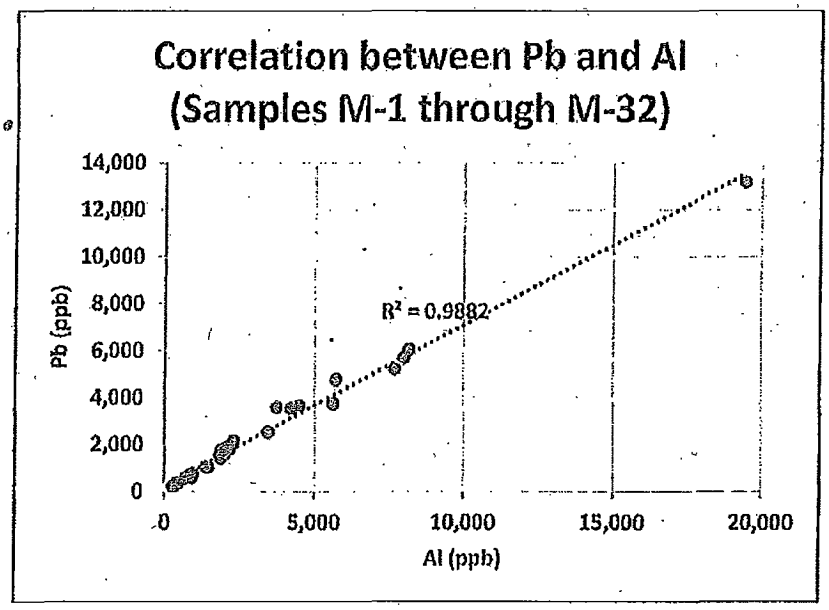
	Medium Flow									
	1 L Sample Bottle							125 mL Sample Bottle		
Element (units)	M-8	M-9	M-10	M-11	M-12	M-13	M-14	M-24	M-25	M-26
Ag (ppb)	0	0	0	0	0	0	0	0	0	0
Al (ppb)	891	2,142	4,493	1,810	431	877	8,159	2,005	286	347
As (ppb)	2.2	2.9	3.9	2.5	2	2.3	4.6	2.7	1.8	2
Ba (ppb)	22	29.1	36.3	28	18.9	22.6	37.1	26.2	18.9	19.4
Ca (ppb)	41,520	41,580	42,080	41,490	41,020	40,850	42,010	40,940	41,110	40,550
Cd (ppb)	1.5	2.4	4	2.1	1	1.5	4.9	2.9	0.9	1
Cl (ppm)	1,329	1,211	1,252	1,225	1,507	1,321	1,324	1,179	1,258	1,318
Co (ppb)	0.4	0.8	1.3	0.7	0.2	0.4	1.4	0.7	0.2	0.2
Cr (ppb)	1.1	1.5	2.2	1.4	1.2	1.1	3.5	2.1	1.1	1.1
Cu (ppb)	104	151	257	144	65	119	267	166	52	59
Fe (ppb)	1,510	2,476	4,254	2,258	912	1,471	4,563	3,450	711	820
K (ppb)	3,363	3,391	3,370	3,352	3,344	3,311	3,360	3,308	3,356	3,311
Mg (ppb)	9,769	9,960	12,360	9,703	9,331	9,513	16,430	10,820	9,237	9,166
Mn (ppb)	498	1,185	1,878	1,052	231	536	1,947	967	167	220
Mo (ppb)	1.8	1.8	1.8	1.9	1.8	1.8	2.2	2	1.7	1.7
Na (ppb)	17,240	17,370	17,370	17,310	17,190	17,010	17,320	17,020	17,140	16,950
Ni (ppb)	4.1	7.7	16.2	6.8	2.7	3.8	33	7.7	2.1	2.4
P (ppb)	321	690	1,233	595	178	332	1,697	573	144	163
Pb (ppb)	688	1,791	3,655	1,549	366	616	6,048	1,631	237	292
S (ppm)	27.6	27.5	27.3	27.3	27.1	26.9	27	26.4	27	26.6
Se (ppb)	0	0	0.2	0.1	0.1	0.2	0.2	0.3	0.1	0
Si (ppb)	2,892	3,591	6,180	3,307	2,445	2,756	11,280	4,184	2,274	2,303
Sn (ppb)	2.2	2.6	4.4	2.5	1.4	1.8	4.9	3	1	1.1
Sr (ppb)	124	128	128	126	124	124	128	126	125	124
Ti (ppb)	1.6	2.9	5.5	2.5	1	1.2	7.7	2.7	0.4	0.6
U (ppb)	0.5	0.9	1.7	0.9	0.4	0.5	2.7	0.9	0.3	0.3
V (ppb)	8.4	11.9	17.5	10.4	8.2	8.4	25.1	9.7	6	7.4
Zn (ppb)	657	933	1,669	836	366	592	1,934	1,304	305	337

	High Flow											
	1 L Sample Bottle						125 mL Sample Bottle					
Element (units)	M-15	M-16	M-17	M-18	M-19	M-20	M-27	M-28	M-29	M-30	M-31	M-32
Ag (ppb)	0	0	0	0	0	0	0	0	0	0	0	0
Al (ppb)	7,984	5,713	3,714	912	1,354	19,440	1,893	248	455	822	1,859	2,176
As (ppb)	5	4.1	4.3	1.9	2.1	7.4	2.9	2	2.2	2.3	3.2	3.4
Ba (ppb)	40	37	45	21	22	41	32	19	20	22	31	34
Ca (ppb)	42,200	41,870	41,760	41,120	41,110	43,860	41,410	40,730	40,990	40,550	41,000	41,050
Cd (ppb)	5.6	4.1	3.7	1.4	1.9	9.3	2.2	0.9	1.2	1.6	2.1	2.5
Cl (ppm)	1,347	1,261	1,088	1,150	1,138	1,285	891	1,261	1,309	1,215	1,121	1,226
Co (ppb)	1.6	1.4	1.7	0.4	0.4	1.9	0.9	0.2	0.3	0.4	0.9	1
Cr (ppb)	2.8	2.4	2.6	1.3	1.3	4.8	1.7	1.1	1.5	1.5	1.6	1.8
Cu (ppb)	541	24	276	89	105	351	165	52	70	96	167	192
Fe (ppb)	4,926	4,288	5,323	1,509	1,705	6,491	3,074	667	1,215	1,591	3,026	3,349
K (ppb)	3,363	3,350	3,343	3,327	3,305	3,410	3,361	3,320	3,348	3,287	3,333	3,331
Mg (ppb)	15,910	13,430	9,758	9,633	10,240	29,890	9,110	9,158	9,305	9,462	9,051	9,157
Mn (ppb)	2,067	2,058	2,818	498	503	1,975	1,401	149	301	534	1,369	1,638
Mo (ppb)	2	2	2	1.9	1.9	2.2	1.8	1.8	1.8	1.8	1.8	1.8
Na (ppb)	17,340	17,310	17,280	17,110	16,980	17,540	17,370	17,040	17,210	16,840	17,250	17,230
Ni (ppb)	30.6	21.7	11.8	4.6	5.8	80	7.5	3	2.8	3.9	6.3	7.2
P (ppb)	1,758	1,378	1,336	308	378	3,224	771	134	199	299	756	847
Pb (ppb)	5,702	4,781	3,585	755	1,055	13,200	1,752	217	384	715	1,742	1,962
S (ppm)	27.2	26.9	26.8	26.7	26.6	27.1	27	26.6	26.9	26.2	26.8	26.4
Se (ppb)	0.2	0.2	0.2	0	0	0.1	0	0.2	0.1	0.2	0.1	0.1
Si (ppb)	10,530	7,660	3,636	2,830	3,573	26,740	2,680	2,258	2,422	2,687	2,661	2,826
Sn (ppb)	5.6	4.2	3.8	1.8	2	8.9	2.2	1	1.3	1.6	2.2	2.5
Sr (ppb)	129	128	129	125	125	131	128	125	125	125	127	127
Ti (ppb)	8.2	6.1	6.2	1.1	2.2	16.9	3.7	0.5	0.8	1.3	3	3.1
U (ppb)	2.7	2	1.6	0.5	0.6	5.6	0.9	0.3	0.4	0.5	0.9	1
V (ppb)	24.3	19.8	16.3	6.8	8.3	51.3	10.2	6.5	7.8	8	10.9	11.7
Zn (ppb)	2,520	1,622	1,305	593	796	3,652	752	293	395	603	739	856

Correlation between lead, phosphorus and aluminum

The correlation of lead and phosphate, as well as lead and aluminum, indicate that the samples were captured scale and sediment that had formed inside the pipes while the City of Flint was purchasing water from Detroit. The absence of these chemicals in the current treatment provided by Flint indicate that these elements were not in the water passing through the pipes, but came from the scales inside the service line which had disintegrated into the water or were dislodged into the water.

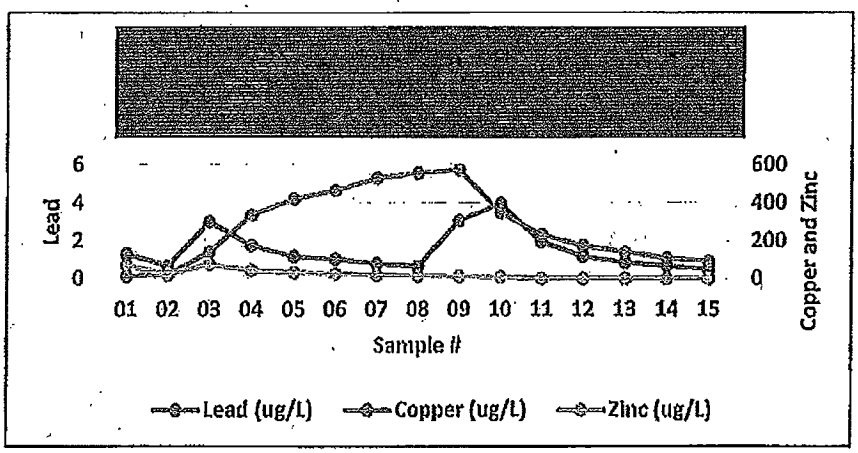




U.S. EPA Region 5 sampling

[redacted] residence (following replacement of service line)

Following the replacement of the [redacted] original service line, a series of 15 sequential samples were collected from the kitchen tap to measure the lead levels and other parameters to ensure that the high lead from the original service line had not contaminated the interior plumbing at the [redacted] home. With the exception of two areas, lead levels were low throughout the [redacted] plumbing following the service line replacement. The two sources of lead that were still detected in the plumbing are likely the water meter (Sample 3) and the new external service shut-off valve (Samples 9-11). Although new brass plumbing components must be lead-free, there can still be some lead that is released from these components.



[redacted] ([redacted] home)

After Service Line Replacement

Sample #	Site Description	Copper (ug/L)	Lead (ug/L)	Zinc (ug/L)	Cadmium (mg/L)	Iron (mg/L)	Phosphorus (mg/L)
01	Kitchen	13.1	1.3	70.9	U	0.171	U
02	Kitchen	20.1	0.687	23.2	U	0.117	U
03	Kitchen	141	3.01	76.8	U	0.144	U
04	Kitchen	336	1.76	45.4	U	0.151	U
05	Kitchen	419	1.17	32.2	U	0.149	U
06	Kitchen	463	1.03	24.8	U	0.149	U
07	Kitchen	529	0.8	19.6	U	0.146	U
08	Kitchen	554	0.666	14.9	U	0.147	U
09	Kitchen	571	3.07	11.6	U	0.195	U
10	Kitchen	345	3.93	10.3	U	0.282	U
11	Kitchen	233	1.94	0	U	0.283	U

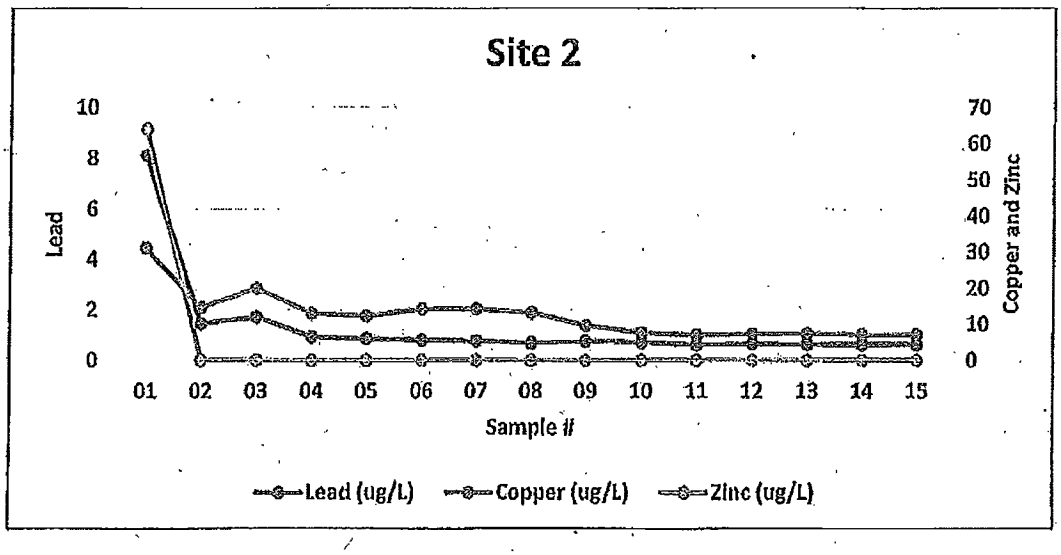
[redacted]. ([redacted] home)

After Service Line Replacement

Sample #	Site Description	Copper (ug/L)	Lead (ug/L)	Zinc (ug/L)	Cadmium (mg/L)	Iron (mg/L)	Phosphorus (mg/L)
12	Kitchen	171	1.17	0	U	0.290	U
13	Kitchen	139	0.864	0	U	0.292	U
14	Kitchen	110	0.67	0	U	0.294	U
15	Kitchen	91.5	0.505	0	U	0.297	U
16	Bathroom	29.7	5.52	71.3	U	0.259	U
17	Water Heater	70.4	31.7	883	U	0.540	0.0877
18	Water Heater	35	9.74	346	U	0.0870	U

Site #2 (Bryant Street)

Based on the results found at this home, it does not appear that any portion of the service line is made of lead, and as a result, the lead levels are low in most samples. The exception is in Sample 1 which reflects water within approximately 15 feet of the kitchen tap and is likely due to brass components in the faucet, underlying valves and fixtures.



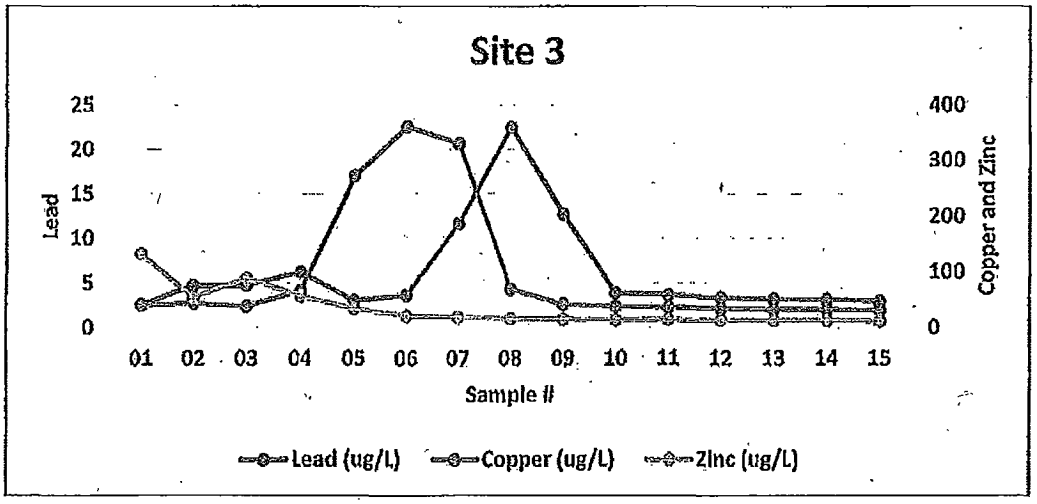
Site 2

(Note: U for Zinc replaced with 0 to show on graph)

Sample #	Copper (ug/L)	Lead (ug/L)	Zinc (ug/L)	Cadmium (mg/L)	Iron (mg/L)	Phosphorus (mg/L)
01	31.1	8.11	64	U	0.0307	U
02	14.7	1.46	U	U	0.0302	U
03	20	1.72	U	U	0.0302	U
04	13	0.933	U	U	0.0301	U
05	12.3	0.862	U	U	0.0311	U
06	14.2	0.795	U	U	0.0298	U
07	14.2	0.769	U	U	0.0311	U
08	13.3	0.691	U	U	0.0317	U
09	9.6	0.774	U	U	0.0319	U
10	7.57	0.715	U	U	0.0313	U
11	7.04	0.611	U	U	0.0301	U
12	7.3	0.655	U	U	0.0336	U
13	7.37	0.644	U	U	0.0308	U
14	7.09	0.631	U	U	0.0313	U
15	7.05	0.621	U	U	0.0300	U

Site #3 (Bryant Street)

Based on the results found at this home, it appears that the portion of the service line from the external service shut-off valve to the water main is made of lead as indicated by the increase in lead levels in samples 7 through 9.



Site 3

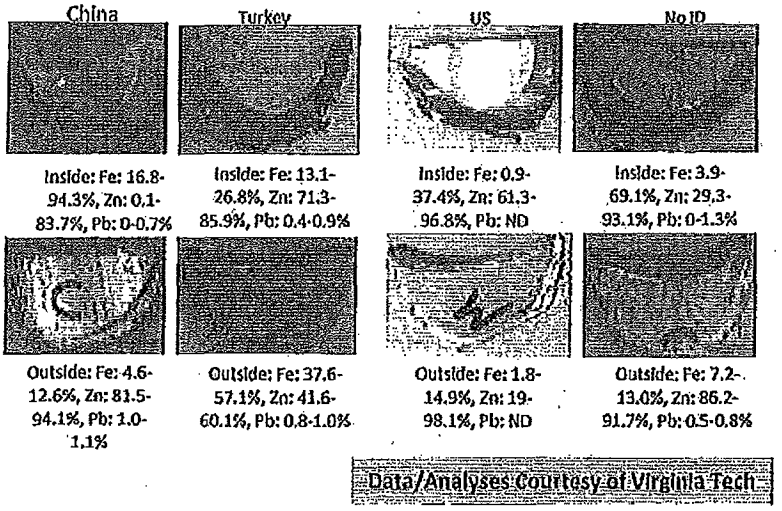
Sample #	Copper (ug/L)	Lead (ug/L)	Zinc (ug/L)	Cadmium (mg/L)	Iron (mg/L)	Phosphorus (mg/L)
01	40.7	2.63	132	U	0.0622	U
02	44.4	4.77	55.3	U	0.249	U
03	39.3	4.79	88.8	U	0.179	U
04	66.8	6.26	57.2	U	0.346	U
05	272	3.07	34.2	U	0.105	U
06	362	3.7	21.4	U	0.0598	U
07	331	11.7	19.5	U	0.0512	U
08	69.9	22.5	16.6	U	0.0399	U
09	42.5	12.7	15.1	U	0.0480	U
10	38.4	3.94	14.4	U	0.0489	U
11	37.5	3.72	14.5	U	0.0492	U
12	34.8	3.39	13.6	U	0.0481	U
13	33.1	3.23	13.1	U	0.0484	U
14	32.8	3.2	13	U	0.0480	U
15	31.4	3	12.3	U	0.0490	U

Analysis of [redacted] original service line pipe (galvanized iron portions)

Lead can also be found in galvanized pipe coatings as a contaminant in the zinc that is used to coat the surface of iron pipe in the galvanizing process. As such, two sections of the [redacted] original service line were analyzed for lead content.

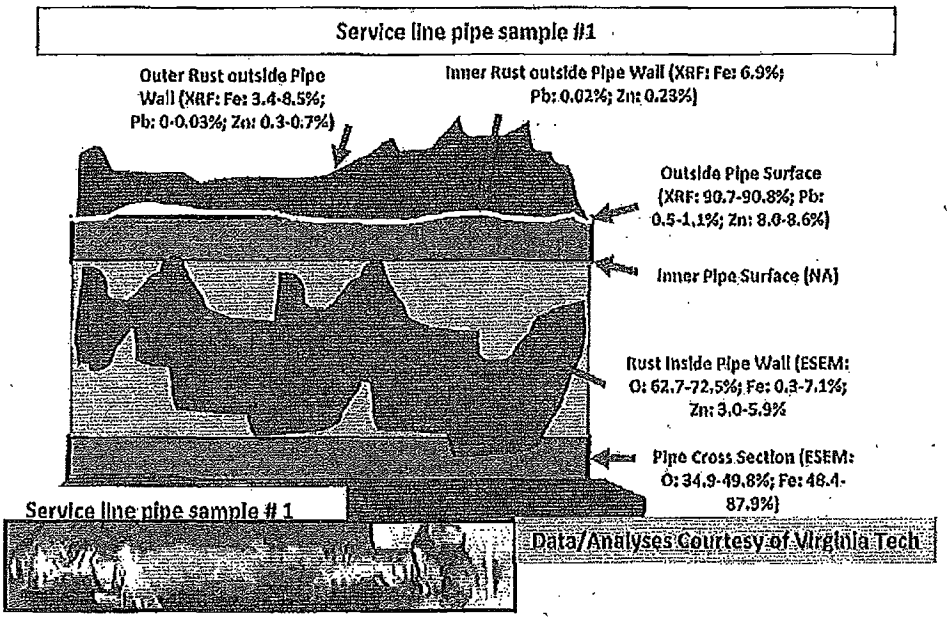
The images and data presented below are for a typical range of galvanized iron pipe.

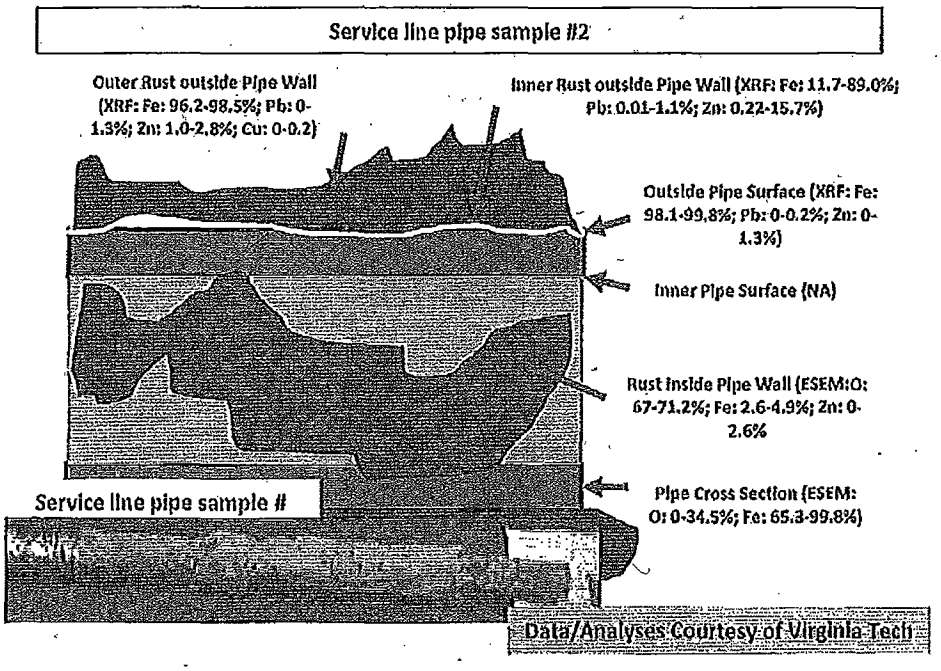
Lead Content of Galvanized Iron Pipe - Examples



Data/Analyses Courtesy of Virginia Tech

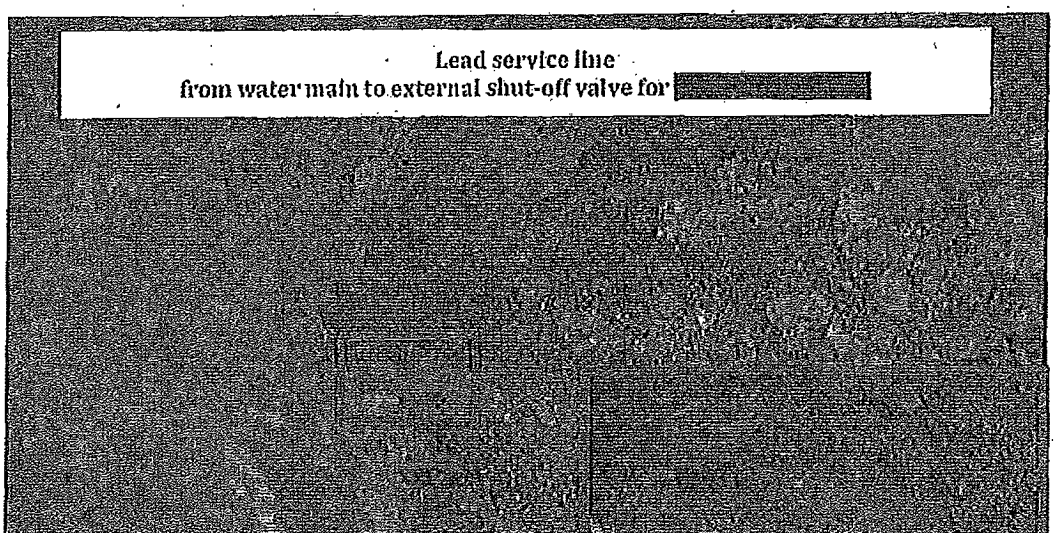
Below are the results of the galvanized pipe analyses conducted by Virginia Tech on the two sections of galvanized iron pipe from the [redacted] original service line. The analyses indicate that the [redacted] original service line was a typical galvanized iron pipe.





Lead portion of the [redacted] original service line

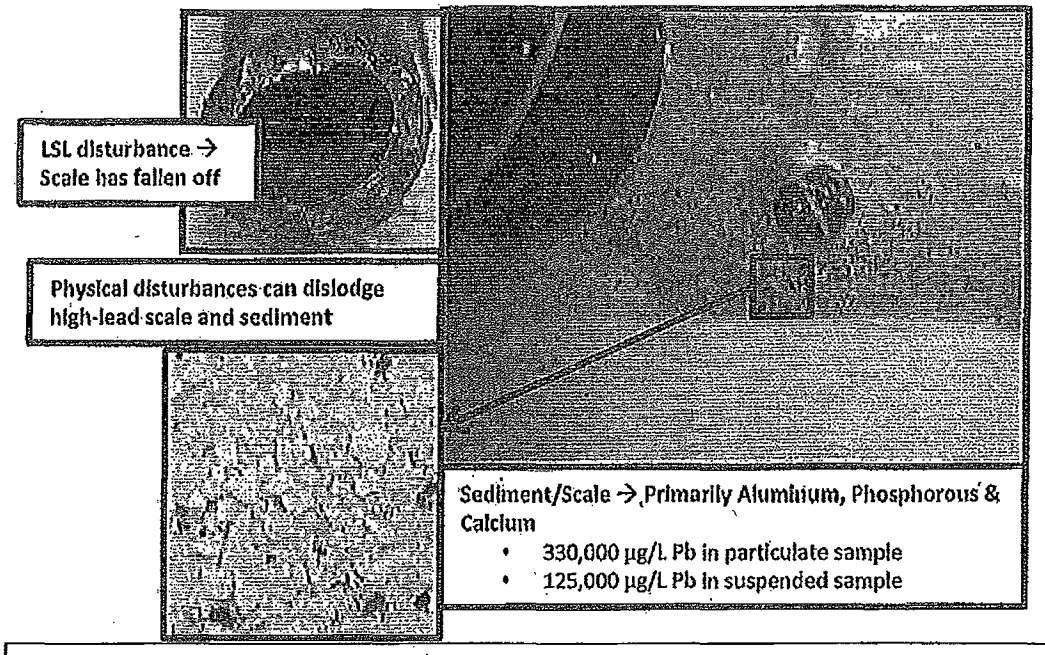
Lead service lines can contribute up to 75 percent of the total mass release into the water. The portion of the [redacted] original service line from the water main to the external shut-off valve at the corner of [redacted] and Bryant Street is made of lead and is estimated to be approximately 25 feet in length.



Appendix C – Additional Information

Physical disturbance of lead service lines

A recent EPA study indicates that physical disturbances to lead service lines or in proximity to lead service lines can cause the dislodging of the protective scales from within the lines. The photograph below shows the scale that was dislodged from inside a lead service line during routine maintenance work in another city due to a physical disturbance of the line. The dislodged scale and sediment contained a very high concentration of lead.



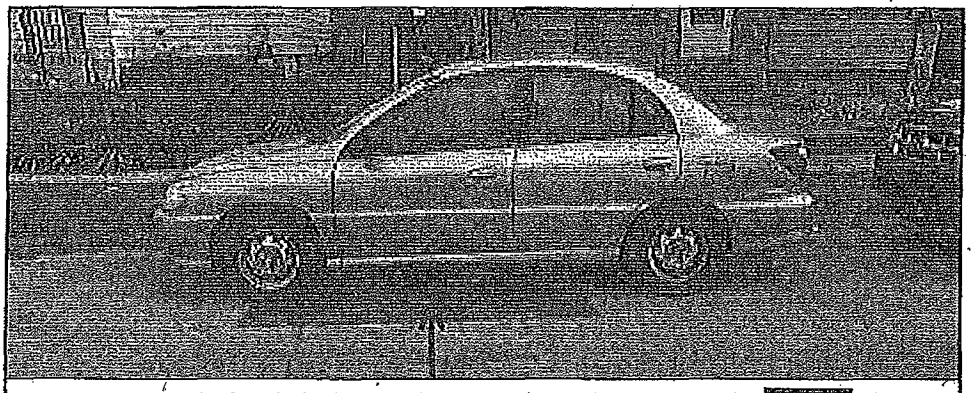
Lead service line disturbances were found to be a common factor for the majority of sites with high lead levels. It is also possible that low water usage may play a role in sites with the highest lead levels.

Lead service line scale analyses conducted by EPA's Office of Research and Development or obtained from peer-reviewed published literature from cities across the U.S. and in Canada (summarized below) show that scales within lead service lines can contain very high concentrations of lead. The yellow highlighted column in the table below shows the percentage of lead that has been found within different scales inside of lead service lines.

Lead & Element Percentages in Important Corrosion Byproduct Solids							
Mineral Name	Formula	% Pb	%C	%O	%S	% P	%Cl
litharge, massicot	PbO	97.80	0.00	7.20	0.00	0.00	
plattnerite, scrutinyite	PbO_2	86.60	0.00	13.40	0.00	0.00	
Cerussite	$PbCO_3$	77.50	4.50	18.00	0.00	0.00	
Hydrocerussite	$Pb_3(CO_3)_2(OH)_2$	80.10	3.10	16.50	0.00	0.00	0.00
Plumbonacrite	$Pb_{10}(CO_3)_6(OH)_6O$	81.30	2.80	15.70	0.00	0.00	0.00
Anglesite	$PbSO_4$	68.30	0.00	21.10	10.60	0.00	0.00

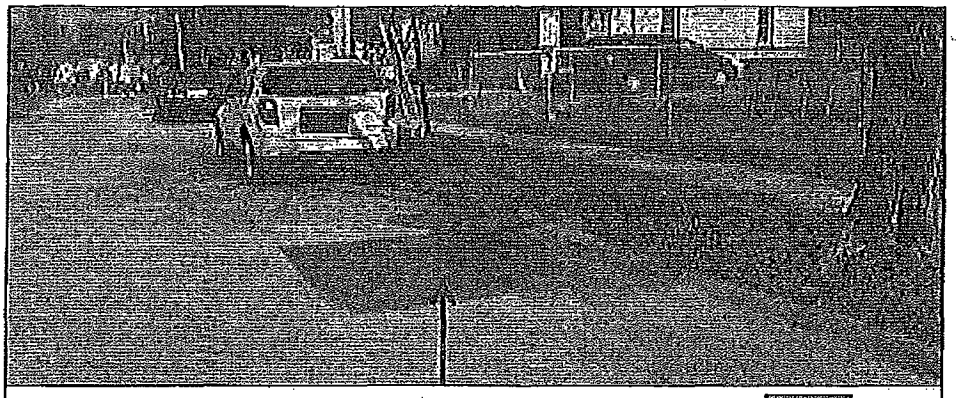
Lead & Element Percentages in Important Corrosion Byproduct Solids							
Mineral Name	Formula	% Pb	%C	%O	%S	%P	%Cl
Leadhillite, Susannite, MacPhersonite	$Pb_4(SO_4)(CO_3)_2(OH)_2$	76.80	2.20	17.80	3.00	0.00	0.00
Hydroxypyromorphite	$Pb_5(PO_4)_3OH$	77.43	0.00	15.55	0.00	6.95	0.00
Chloropyromorphite	$Pb_5(PO_4)_3Cl$	76.38	0.00	14.15	0.00	6.85	2.61
Tertiary Lead Orthophosphate	$Pb_3(PO_4)_2$	76.60	0.00	15.80	0.00	7.60	0.00
Lead(II) orthophosphate	$Pb_9(PO_4)_6$	76.60	0.00	15.80	0.00	7.60	0.00

While visiting the [redacted] home, two fresh patches of asphalt were seen along the parkway where the [redacted] original service line was located. The jarring and vibration associated with excavation can dislodge the high lead-bearing scales from within the service line pipes.



Recent patch (#1) of asphalt along curb next to the parkway where the [redacted] service line runs.

Photograph taken by U.S. EPA on April 27, 2015



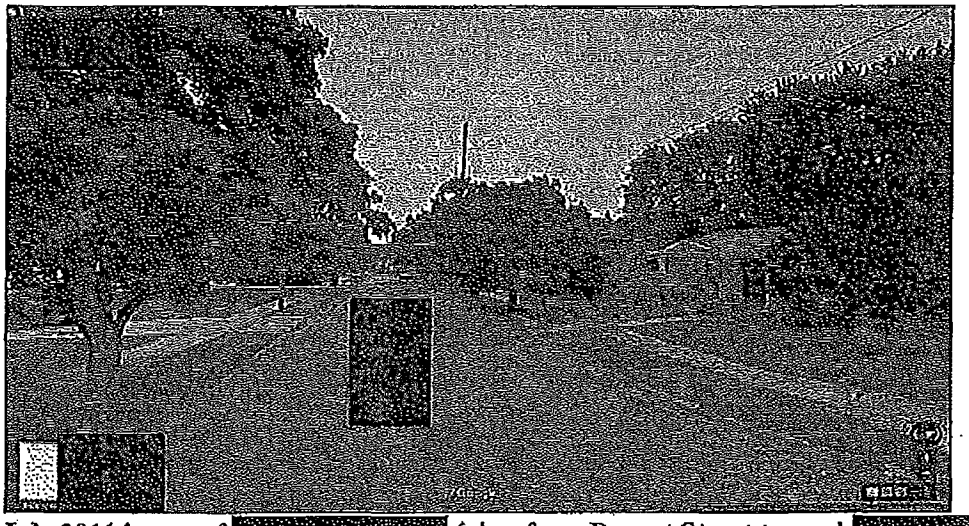
Recent patch (#2) of asphalt along curb next to the parkway where the [redacted] service line runs.

Photograph taken by U.S. EPA on April 27, 2015



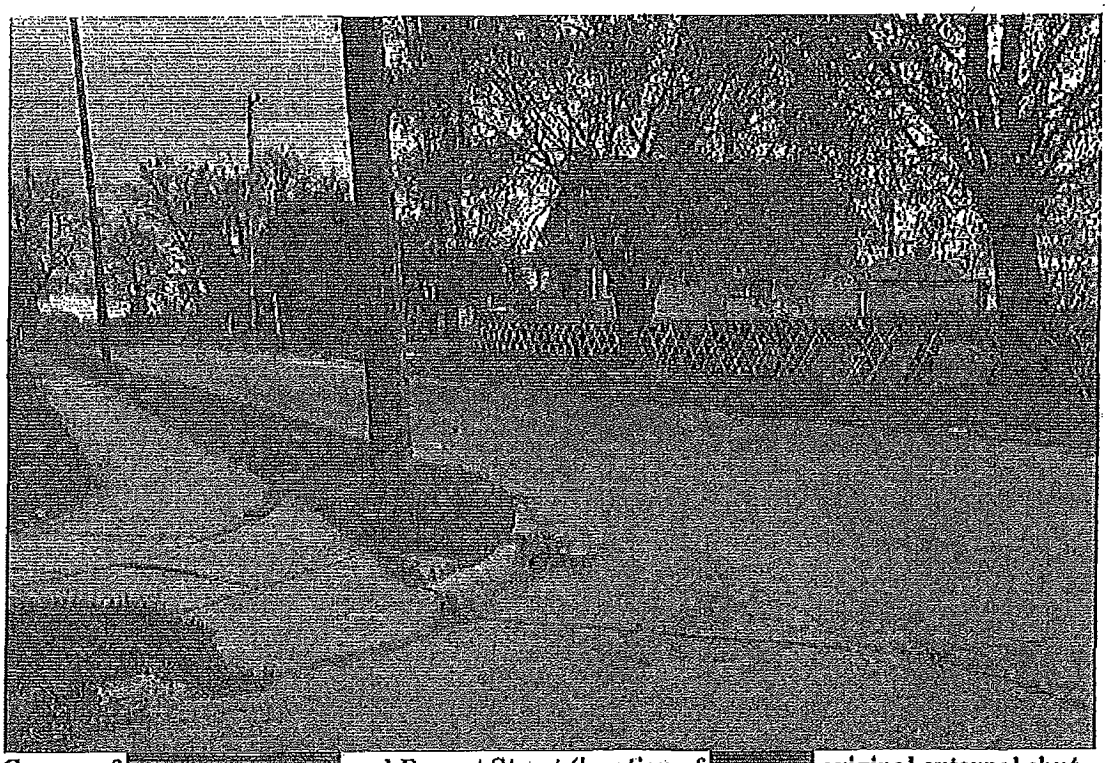
July 2011 image [redacted] (view from [redacted] toward Bryant Street).

Google 'Street View' Image 1 captured in July 2011 shows no patches in street along curb next to the parkway where the [redacted] service line runs toward Bryant Street, indicating that the physical disturbances occurred after the date this image was captured (July 2011).



July 2011 image of [redacted] (view from Bryant Street toward [redacted]).

Google 'Street View' Image 2 captured in July 2011 shows no patches in street along curb next to the parkway where the [redacted] service line runs toward Bryant Street, indicating that the physical disturbances occurred after the date this image was captured (July 2011).



Corner of [redacted] and Bryant Street (location of [redacted] original external shut-off valve).

Photograph taken by EPA on April 27, 2015 shows no visible signs of physical disturbances in the vicinity of the lead portion of the [redacted] service line from the external shut-off valve to the water main on Bryant Street.

FOIA REQUESTS RELATING TO THE FLINT WATER ISSUE

TABLE OF CONTENTS
Flint FOIAs - prepared 12/13/2015

To search this pdf by keyword, right click on the document, select FIND from the drop down menu, and then enter your search criteria in the pop up box.

FOIA#	DateRr	FirstName	LastName	Company	Description	Completed
15-5521	7/22/2015	Curt	Guyette	American Civil Liberties Union of Michigan	Lead and copper tests in city of Flint, January 2015 thru June 2015, all communications	8/11/2015
15-6034	8/18/2015	Curt	Guyette	American Civil Liberties Union of Michigan	Water sample tests for lead and copper, City of Flint water samples between January 1, 2015 and June 30, 2015 **(DUPLICATE of 15-6123)**	Refer to 15-6123
15-6123	8/18/2015	Curt	Guyette	American Civil Liberties Union of Michigan	Lead and copper tests in city of Flint, January 2015 thru June 2015, all communications, procedures for handling and testing water samples	8/28/2015
15-6360	9/2/2015	Marc	Edwards	Virginia Tech	MDEQ statement to a reporter with a Flint newspaper regarding lead poisoning of Flint children	9/22/2015
15-6422	9/4/2015	Phil	Phelps		Any waivers, permits or applications to use the Flint River as a source for water and/or drinking water for the City of Flint, etc.	9/30/2015
15-6429	9/7/2015	Marc	Edwards	Virginia Tech	Flint lead in water: original Flint LCR report which prompted a conference call with DEQ staff, that caused Flint to revise their report, all documents regarding conference call and rationale given for invalidating two samples, etc.	9/14/2015
15-6525	9/7/2015	Marc	Edwards	Virginia Tech	Flint lead in water situation: EPA employee Miguel Del Toral, Virginia Tech research, MDEQ press statement, ACLU's work on Flint water	10/14/2015
15-6526	9/7/2015	Marc	Edwards	Virginia Tech	All documents discussing the need for corrosion control in Flint River water	10/14/2015
15-6566	9/14/2015	Marc	Edwards	Virginia Tech	On July 9th, Mike Glasgow of Flint sent an e-mail saying he submitted more bottles, achieving 76 samples total for the LCR compliance. I would like to see the results of analyzing the 4-6 additional samples.	9/16/2015
15-6675	9/18/2015	Marc	Edwards	Virginia Tech	LCR sampling protocol instructions used by Flint for past 25 years	9/25/2015
15-6797	9/25/2015	Katrinell	Davis	University of Vermont Department of Sociology	Annual Reports on public water System violations, consumer confidence reports for City of Flint, drinking water complaints, etc.	10/29/2015
15-6857	9/29/2015	Curt	Guyette	ACLU of Michigan	Any waivers, permits or applications to use the Flint River as a source for water and/or drinking water for the City of Flint, etc.	***PARTIAL***

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Flint FOIAs - prepared 12/13/2015

FOIA#	DateRcvd	FirstName	LastName	Company	Description	Completed
15-6877	9/30/2015	Hugh	Madden	Progress Michigan	Emails between DEQ and Office of the Governor regarding water service for the City of Flint, emails sent or received by Emergency Managers as well as city officials and employees	***PARTIAL***
16-0045	10/5/2015	Robin	Erb	Detroit Free Press	Test results and correspondence regarding the quality of the Flint City Water Supply	
16-0053	10/5/2015	Ron	Fonger	Mlive Media Group	Correspondence regarding the quality of the Flint city water from January 2014 thru September 21, 2015	**Closed 12/8/15 due to no response**
16-0057	10/5/2015	Ryan	Felton		All communications pertaining to the quarterly test results from December 2014 til January 2015 regarding Flint water	**11/5/2015**
16-0090	10/5/2015	Nancy	Kaffer	Detroit Free Press	Correspondence regarding the quality of the Flint River as a permanent water supply for the City of Flint	**11/5/2015**
16-0215	10/12/2015	Valdemar	Washington	SETTLEmate, Inc.	Analysis of the Flint River as a Permanent Water Supply for the City of Flint, July 2011	**10/16/2015**
16-0317	10/15/2015	Evan	Feinauer	Natural Resources Defense Council, Inc.	Records Concerning Administration of the Safe Drinking Water Act's Lead and Copper Rules	
16-0347	10/17/2015	Marc	Edwards	Virginia Tech	Emails, documents, drafting documents, letters associated with Liane Shekter Smith and Ms. Lee-Anne Walters	***PARTIAL***
16-0367	10/20/2015	Marc	Edwards	Virginia Tech	All communications between July 1, 2015 and present between Brad Wurfel and Sara Wurfel concerning Flint's drinking water	**11/20/2015**
16-0510	10/27/2015	Yanna	Lambrinidou	Parents for Nontoxic Alternatives	Lead-in-water sampling protocols in use now or have been used to sample lead in drinking water of Flint schools between January 2014 and present	**12/8/2015**
16-0609	10/23/2015	John	VanDeventer	Farough & Associates	Water testing standards and protocols for community water supply of Flint, etc.	

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Flint FOIAs - prepared 12/13/2015

FOIA#	DateLtr	FirstName	LastName	Company	Description	Completed
16-0731	11/5/2015	Jim	Henry	Genesee County Health Department	Freeman Elementary School, Flint	**Canceled 11/10/2015**
16-0744	10/27/2015	Hugh	Madden	Progress Michigan	Communication from January 1, 2015 to present between Brad Wurfel and Sara Wurfel along with any attachments to same	

Flint Safe Drinking Water Task Force (FTF 15-1)

Flint Safe Drinking Water Task Force Comments on MDEQ Draft Protocol for Collecting Water Samples at Schools for Lead Analysis

EPA received the latest draft of MDEQ's "Protocol for Collecting Water Samples at Schools for Lead Analysis" for comment from Liane Shekter-Smith on October 19, 2015. Below are comments from EPA's Flint Safe Drinking Water Task Force.

General

There is an understandable urgency to assess the situation in schools, but an equally important consideration should be the ability to assess whether progress is being made over time as treatment is introduced and monitored. It is critically important that everyone understand how to collect samples from the different types of outlets, how to interpret the sample results (i.e., what the results mean and what they don't mean) and how to effectively communicate the results to the public.

Additionally, there is always confusion over what threshold lead levels should be used and what the numerical sampling results mean. It is very important that everyone involved in the sampling and communication have proper training so that accurate information is provided to the public from the beginning. EPA's recommendation is that training be provided by ORD as soon as possible to the health department and others that are involved before the school sampling begins. It would also be good to provide the same entities an overview on corrosion and corrosion control so that the objectives of the sampling and capabilities/limitations of the treatment are properly understood by all.

Sampling protocol

The proposed end-point sampling is useful and can provide information on whether end-point devices should be replaced. Relying solely on the proposed sampling to evaluate the safety of the water in the plumbing overall is not possible. It is essential to have proper baseline data from throughout the school plumbing, not just the endpoints, to assess the risk as well as the progress of treatment. The best sampling protocol for that would be sequential sampling conducted at 2 or 3 locations in each school. The sequential sampling results would enable an ongoing assessment of the effectiveness of treatment throughout the plumbing network over time. This type of an assessment is not possible to do with single samples. Certainty is very important at this stage.

Timing of Sample Collection

If the purpose of the sampling is to identify the sources of lead in the plumbing system and also to identify potential exposure, the timing of the sample collection is important. Do the schools have a program to flush all drinking water consumption taps and coolers and bubblers on the first day back in school after weekends, vacations, etc.? If they do not, the sampling will miss the worst potential exposure for the first few kids drinking the water.

The proposed timing in the protocol indicates that samples should not be collected followed an extended stagnation, such as a weekend. This limitation is more appropriate for samples collected from residences as this does not reflect normal household use. MDEQ should consider collecting samples on different days of the week to get an idea of the conditions throughout the

week. Samples from one or some of the locations taken on Monday mornings would represent the 'worst-case' lead levels found under normal conditions that the children would be exposed to as the water routinely stagnates in the plumbing each weekend that school is in session. Collecting samples during this time would provide more consistent 'worst-case' data under normal usage for evaluating the effectiveness of remedial efforts. Samples could then be taken on a Wednesday and on a Friday under different water use conditions.

On-Site Assessment

The protocol should state that the assessment should record any model number of faucets, valves, etc. that are accessible to inspection, with digital photos included, if possible. Some might be behind walls, but others may be just under sinks, bubblers, etc. This is important in identifying and interpreting the 125 mL samples. If potential brass devices are seen that would not be captured in the 125 mL sample, they should be noted, or an option added to include a 2nd sequential sample for the first draw, if appropriate.

The On-site Assessment should also identify if there is any water treatment being done in the building, i.e., POU or POE.

The second bullet under Step 1 asks about buildings built after 1986 and whether lead-free plumbing and solder was used. Keep in mind that the definition of lead-free was revised in 1996 and again in 2011. Most, if not all, 1986 brass/bronze plumbing fittings and fixtures would fail to meet the current lead-free requirements.

Under Step 5 – Prior to Sample Collection, there is a recommendation to flush the taps the afternoon prior to sampling because drinking water has not been consumed from them for several weeks. This seems to be equated with no use, which may apply to the water coolers and bubblers if shut off, but may not apply to kitchen taps (dish/pot cleaning) and bathroom taps (hand washing). Also, the instruction to school personnel should specify how many minutes to run the tap the day before sampling rather than "several minutes".

Sampling Volumes

Two sequential small volume samples at the beginning is preferable, just to have a better idea of the detail of multiple sources of lead in the proximity of the outlet. It sometimes would save a trip back to collect more samples if there is a high hit in the one sample. If you do the 125 mL only, the identification of plumbing fittings and fixtures in the On-site Assessment will help identify potential sources of lead in the case of a high hit.

George - suggested additions bolded & highlighted. Madelyn

Department of Talent and Economic Development (MTED)

MTED is comprised of the Michigan State Housing and Development Authority (MSHDA), Michigan Economic Development Corporation (MEDC) and the Talent Investment Agency (TIA).

Our combined efforts are focused on short and long-term assistance to the Townships of Mt. Morris, Flint, and Genesee; the Cities of Flint and Burton; and Genesee County through various grants and potential infrastructure assistance. MSHDA has identified allowable funds to assist residents with MSHDA-backed mortgages and the purchase of water/water filters for low income households. MEDC is focused on infrastructure development and qualifying funds for this purpose.

Based on available sources, MTED has assessed potential impacts to the economy of Flint resulting from the water crisis. We developed the attached analysis that looked at 4 potential long term costs associated with certain blood lead levels, which are:

- Lifetime earnings loss total
- Lead Health Care Treatment Costs
- ADHD Treatment Costs
- Special Education Costs

With input from the Department of Treasury, MDTED assessed that the most significant immediate negative impact will be the economic effects of such things as decreased property values, lost business activity (new businesses will not move to Flint and existing businesses that rely on clean water, such as restaurants, will be hurt), lost employment, population loss (renters will leave the city). Residents and businesses will also have to pay extra for bottled water, so the extra spending on water will take away from other spending. It is relatively easy for residents to move some of their economic/spending activity outside the city, so the Flint economy will be hurt. These impacts will create an economic downturn in Flint. In terms of personal income losses, a three to four percent loss in nominal personal income in the City of Flint seems a reasonable estimate, which would equal a negative impact of $85 million to $115 million per year in lost economic activity. Long-term, there will be the significant cost of a new water system. Direct health related costs, estimated by MDHHS, are in addition to this estimate.

Department of Environmental Quality (MDEQ)

MDEQ has been granted primary enforcement authority in Michigan by the EPA for regulatory oversight of all public water supplies, pursuant to the federal State Drinking Water Act. The City began using the Flint River for drinking water in May 2014.

On October 1, 2015 the State Chief Medical Officer confirm**ed** Hurley Children's Hospital blood lead level data. On this same date the Genesee County Health Department issued the customers of the Flint Water Treatment Plant a "Do Not Drink" advisory. On October 2, the state announce**d** the Governor's Flint action plan. On October 15, 2015 the **Michigan State L**egislature authorize**d** $9.35 million to help fund the City's return to purchasing treated water from the DWSD, and to fund comprehensive lead evaluations at City schools, provide free water filters for residents, provide free in-home water tests for residents, and provide free blood lead level testing and follow-up services.

On October 16, 2015 the Flint Water Treatment Plant reverted its source back to DWSD. On October 28, 2015 the MDEQ issued a construction permit for additional corrosion control treatment.

The MDEQ is supporting the response with incident management personnel, lead and copper water test kits and analysis and investigative teams. The connection to the Karegnondi Water Authority is scheduled to be completed in mid to late 2016.

Genesee County Board of Commissioners

1101 BEACH STREET, ROOM 312 FLINT, MICHIGAN 48502

TELEPHONE: (810) 257-3020
FAX: (810) 257-3008

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PEGGE ADAMS
DISTRICT 9

October 1, 2015

Public Health Emergency Declaration for People Using the Flint City Water Supply with the Flint River as the Source

The County is issuing an Emergency Advisory recommending that people not drink the water coming from the City of Flint using the Flint River as the water source unless:

> It has been tested to assure it does not contain elevated levels of lead.
>
> It is being filtered through a National Sanitation Foundation (NSF) approved filter certified to remove lead that meets ANSI standard 53.

Findings reported in the Detroit Free Press September 30, 2015 indicate that Governor Snyder has publically acknowledged that Flint's water supply "appears" to have problems. Snyder has conceded that "it appears that (water) lead levels could be higher or have increased," and that there are "probably things that weren't fully understood when the switch was made." This is in direct contrast to previous reports from the State that downplayed the severity of the situation and conflicted with local data released by researchers at Hurley Medical Center.

Young children are most vulnerable to leads effects, because prior to age six, their brain and central nervous system are still forming and easily susceptible to damage. For an adult to suffer significant health effects, exposure to lead would have to be sustained and more intense. Most adults who are affected by lead have been exposed in an occupational setting, such as working as a house painter or in a battery recycling plant.

Pregnant women are at special risk because the lead they absorb crosses the placenta and enters the fetus.

It's important to remember that there is no known safe level of lead in a human body, Experts now use a reference level of 5 micrograms per decilter to identify children with blood lead levels that are much higher than most children's levels. This new level is based on the U.S. population of children ages 1-5 years who are in the highest 2.5% of children when tested for lead in their blood.

Lead in water can contribute to a child's blood lead level. The Michigan Department of Environmental Quality, who regulates municipal water supplies, has assured us that the water leaving the Flint Water Plant meets all Federal and State requirements. The City of Flint has a documented problem with lead in its drinking water due to service and household lines that may contain lead or lead solder which can leach lead because of the corrosivity of the water since changing to the Flint River as the source supply. Generally, those who are most vulnerable

to leads health effects from exposure to unfiltered tap water are the very youngest children. For this reason, if you are not sure about the lead content in your tap water, it's best to either use a filter that has been found to be effective for reducing or eliminating lead, or to use bottled water instead. Water filters should be National Sanitation Foundation (NSF) certified to remove lead and meet ANSI standard 53. If these options are not available to you, then it's best to let the water run for at least five minutes before using it for either drinking or cooking purposes. Always use cold water instead of hot water for drinking and cooking.

It's especially important to avoid using untested or unfiltered tap water for mixing infant formula unless you can assure your water is lead free.

When leaded gasoline was in widespread use in this country, the lead came out the tail pipe and was deposited in yards near the roads. That lead may still be in those yards. In addition, lead paint continues to be a major source of childhood lead poisoning and can be found in homes built before 1978 when lead paint was banned in the U.S. and may be a hazard inside and outside the home especially where paint is worn or flaking.

There are many other potential sources of lead exposure, including:

- "Home remedies" and cosmetics imported from other countries
- Tamarind or chili-based candies from Mexico
- Stained glass windows
- Fishing sinkers
- Firing ranges
- Old, deteriorated mini-blinds
- Bean pots and painted ceramics
- Crystal decanters
- Lead crystal glassware

Since no safe level has been identified it is in everyone's interest to reduce exposure to lead as much as possible. Recommendations on ways to reduce lead exposure can be found on the Genesee County Health Department website www.gchd.us and Center for Disease Control and Prevention website: http://www.cdc.gov/nceh/lead/tips.htm .

Recent data provided by Hurley researchers has indicated a significant increase in blood lead levels in children after the switch to Flint River water. The County Health Officer has requested that MDHHS provide specific data to support their claim that state data is more comprehensive and does not show a significant increase. To date the state has failed to provide the requested data by the September 30, 2015 deadline in our previous request to the state.

COUNTY OF GENESEE

BY: _____ Date: 10-1-15

Jamie W. Curtis, Chairperson
Board of Commissioners

BY: Brenda Clack Date: 10-1-15

Brenda Clack, Chairperson
Human Services Committee
Board of Commissioners

BY: Bryant W. Nolden Date: 10-1-15

Bryant W. Nolden, Vice Chairperson
Board of Commissioners

GENESEE COUNTY HEALTH DEPARTMENT

BY: Mark Valacak Date: 10-1-15

Mark Valacak, M.P.H.
Health Officer

Tentative Emergency Assistance to Flint

Preliminary Draft; subject to change

	Fiscal Year	Local State External	Agency	one-time GF/GP*	one-time Gross*	Type of Request	Explanation
1	2016	City	DEQ	$2,000.0	$2,000.0	Supplemental request	Water system needs
2	2016	City	DEQ	$3,000.0	$3,000.0	Supplemental request	Potential payment to city to aid utility issues
3	2016	State	DEQ	$250.0	$250.0	Supplemental request	Lab and Testing Costs (COSTS OF TREATMENT MAY)
4	2016	City	DEQ	$36.5	$36.5	Supplemental request	Maintain additional corrosion control procedures for one year (PLUMBING)
5	2016	Contractors	DEQ	$500.0	$500.0	Supplemental request	Infrastructure integrity study using outside experts (IN DEPTH RELIABILITY STUDY & INFRASTRUCTURE NEEDS) (OUTSIDE CONTRACTOR)
6	2016	County	DHHS	$200.0	$200.0	Supplemental request	Funding to Genesee County Food Safety Division for food inspections at licensed food establishments
7	2016	Contractors	DHHS	$275.0	$275.0	Supplemental request	Contractual expertise to assess potential linkages to Legionnaire's disease
8	2016	State	DHHS	$8,000.0	$8,000.0	Supplemental request	Emergency purchases of bottled water, filters, and replacement cartridges; augment with $5M in FEMA funds; additional funding will be needed
9	2016	State	DHHS	$0.0	$145.0	Supplemental request	Partial year cost for epidemiologists to analyze blood lead levels.
10	2016	Contractors	DHHS	$0.0	$1,510.0	Supplemental request	DHHS field operations costs
11	2016	Contractors	DHHS	$0.0	$90.0	Supplemental request	Partial year costs for additional lead investigations
12	2016	State	DHHS	$0.0	$70.0	Supplemental request	Partial year costs for nurse case management
13	2016	County	DHHS	$0.0	$120.0	Supplemental request	Partial year costs for additional positions for community education with Genesee County Health Department
14	2016	Schools State	DHHS	$1,470.0	$1,470.0	Supplemental request	Child and adolescent health centers - support for children's healthcare access program

Tentative Emergency Assistance to Flint

Preliminary Draft; subject to change

	Fiscal Year	Local State External	Agency	one-time GF/GP*	one-time Gross*	Type of Request	Explanation
15	2019	Local	DHHS	$30.0	$957.0	Supplemental request	Nutrition support WIC staff/education and screening; lactation consultant to Genesee County Health Department
16	2016	CMH	DHHS	$1,335.0	$3,870.0	Supplemental request	Treatment of children with high blood levels (diagnostic testing, nurse visits, environmental assessments, etc.)
17	2016	CMH	DHHS	$500.0	$500.0	Supplemental request	Crisis counseling through local CMH
18	2016	State	DMVA	$2,000.0	$2,000.0	Supplemental request	Michigan National Guard water support effort (3 months)
19	2016	State	LARA	$2,000.0	$2,000.0	Supplemental request	Fixture replacements (schools, daycares, adult foster care, nursing homes, dialysis centers, surgery centers); replace fixtures that fail to meet standards
20	2016	Schools	MDE	$320.0	$320.0	Supplemental request	Partial year costs for additional nurses at schools in Flint
21	2016	Schools	MDE	$615.0	$615.0	Supplemental request	Genesee Intermediate School Districts
22	2016	Local State	MSP	$100.0	$100.0	Supplemental request	Operational funding for Flint Interagency Advisory Committee
FY2016 Supplemental Subtotal				**$22,631.5**	**$28,028.5**		

DEQ Subtotal	$5,786.5	$5,786.5
DHHS Subtotal	$11,810.0	$17,207.0
DMVA Subtotal	$2,000.0	$2,000.0
LARA Subtotal	$2,000.0	$2,000.0
MDE Subtotal	$935.0	$935.0
MSP Subtotal	$100.0	$100.0
Total	**$22,631.5**	**$28,028.5**

George- If we combine sampling sites to deliver to the lab we need to keep track of our chain of custody.

Flint Water Sample Transfer of Custody Form

Sample Collection Date: _____

I dummied this up. Liz.

Sample Collection Site: _____

Number of Sample Locations: _____

Samples Relinquished By: (Print) _____

(Signature) _____

Samples Accepted By: (Print) _____

(Signature) _____

DRAFT

ATTACH A COPY OF THE SAMPLING SEQUENCE DOCUMENT TO THIS FORM

DEQ

Department of Environmental Quality
Cost Estimates for Testing Drinking Water in Michigan Schools
December 21, 2015

Cost Per School		
Sample Costs		
Cost per Sample	$	28
Average Number of Samples Needed per School		250
Sample Costs	$	7,000
Labor Costs		
Plumbing Evaluation (two people needed for one day)	$	1,120
Sampling Staff (four people needed for one day)	$	2,240
Labor Costs	$	3,360
Average Cost per School	$	10,360
Statewide Cost		
Number of Public, Charter, and Private School Buildings in Michigan		7,900
Estimated Cost to Test All Michigan Schools	$	81,844,000

City of Flint Water
Action Steps for Week of October 26-30

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Conduct After Action Plan	DEQ	George Krisztian	Initial meeting held 10/22/15
2.	Introduce legislative changes to Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone George Krisztian Sonya Butler	Draft language submitted to Maggie Pallone for review
3.	After Action Review Panel	DEQ	Madhu Anderson George Krisztian Karen Tommasulo	Panel created and press release issued on 10/21/15
4.	Staff hiring plan	DEQ	Jim Sygo Maggie Pallone George Krisztian	
5.	Finalize fiscal year 2017 budget request	DEQ	Maggie Pallone George Krisztian	
6.	Meeting(s) with school staff/management	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	A meeting with the 10 remaining schools is tentatively scheduled for the week of 10/26/15
7.	Meet with DHHS and discuss all lead education material for schools	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	Meeting scheduled for 10/27/15 Planning Mtg on infants Food Sites Created
8.	Review corrosion control treatment plan and get any EPA comments	DEQ and EPA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Summary of Flint's corrosion control plan submitted to EPA

George -

Steve Busch

asked that you

call him when

you return. He

can be: PPI

Ste. 6 1028

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
9.	Review construction permit application and issue construction permit for phosphate equipment	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	Remaining items due are anticipated to be provided on 10/27/15
10.	Review Standby Operation of Flint Water Treatment Plant with city of Flint	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Comments by DEQ to city of Flint have been provided
11.	Work with Karegnondi Water Authority (KWA) and other agencies to address bottleneck issues; check weekly for status update	DEQ and KWA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Issues regarding soil erosion controls during construction are being addressed
12.	Contact city of Flint for Service Line Record status update and obtain a copy of the records to date	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Nearly 11,000 records received and waiting for review by DEQ staff
13.	Provide DHHS with any available cross-reference information	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
14.	Develop childcare facility guidance or review DHHS related materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	DEQ has contacted DHHS to schedule a meeting
15.	Create a generic school sampling guidance document for statewide distribution; target audience: schools served by municipal water	DEQ and DLARA	Jim Sygo Steve Busch Richard Benzie	

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
16.	Confirm plumbing assessment and sampling is scheduled for Brownell K-2 STEM Academy and Eisenhower Elementary School	DEQ and DLARA	Jim Sygo Steve Busch Mike Prysby	Tentatively scheduled for 10/30/15

REQUEST FOR WATER ANALYSIS

Billing Information

Name	DWL Account number
MDEQ - RRD Div #900040-00	M99953605
Mailing Address: Flint Residential Lab Services	
City: Lansing	State: MI / Zip: 48910

See reverse side for sample instructions and information

WSSN (Type I-II Public Water)	Does sample contain chlorine?	For questions call:
2310	(●) Yes ( ) No	810-787-6537 ext. 3501

SAMPLE SOURCE
- ( ) 0 - Single Family Dwelling
- ( ) 9 - Other

SAMPLING PURPOSE
9 - Other

SAMPLE POINT
9 - Other

REPORT RESULTS TO: (*PLEASE PRINT*) NOTE: RESULTS WILL BE EMAILED TO YOUR LOCAL COUNTY HEALTH DEPARTMENT

Name	E-mail address	
Mike Glasgow	mglasgow@cityofflint.com	
Mailing Address: 4500 N. Dort Hwy	Area Code & Phone number: 810-787-6537	
City: Flint	State: MI	ZIP Code: 48505

SAMPLE COLLECTION INFORMATION (*PLEASE PRINT*)

Sample Collector Name	Date Collected	Time Collected ( ) AM ( ) PM

Collector Code
- ( ) 0 - County Personnel
- ( ) 1 - Water Supply Operator
- ( ) 3 - Private Citizen
- ( ) 4 - DEQ Staff other than DW
- ( ) 9 - Other

System/Owner Name		
Collection Site (Street Address)	Township (If known)	Section (If known)
City / County: Genesee	ZIP Code	Well Number (If more than one)
Sampling Point: ( ) Kitchen ( ) Bathroom	Site Code or Permit Number (If known)	

TEST CODE	INVESTIGATION UNIT #	DRINKING WATER TEST
CCUB	36CC - 1 Liter	Lead/Copper for Investigation

Return sample and form to either Flint City Hall or the Flint Water Plant.

Samples must be received in the laboratory within 14 days of collection.

DRAFT

1. Testing all Flint schools, preschools and day cares.
   Summary of results to date (George to provide)

~~To date, all of~~ the Flint Community Schools have undergone an initial plumbing evaluation to determine lead exposure risks. The results of these evaluations show that the primary source of exposure is from fixtures such as faucets and fountain heads. This is good news as these are relatively easy and inexpensive to replace compared to plumbing deep within the system. Once these fixtures have been replaced, additional testing will be conducted to ensure that the issues have been properly addressed. This free service is also being offered to all private schools and daycare facilities using the Flint water system ~~and testing of those facilities~~ will begin in January.

2. Offer water testing at no cost to Flint residents to assure safe water
   Summary of results to date (George to provide)

Flint residents have been offered free lead testing of the water in their home. To date, over 600 samples have been tested. While the overall results are encouraging and show that lead levels are trending downwards with many homes showing lead levels well within Federal guidelines, there are some results that show elevated levels that are concerning. Since lead levels in water can vary greatly from home to home it is important that all Flint residents take advantage of this free testing.

3. Expedite optimizing corrosion Control in the Flint drinking water system
   Summary of date completed (George to summarize)

On October 16th of 2015, the city of Flint moved back to using water from the Detroit Water and Sewer Department (DWSD). On December 9th the City of Flint began supplemental phosphate addition to the water to accelerate the rebuilding of the protective layer in the water distribution system. Additional work is also being done to ensure that appropriate corrosion controls are in place for when the city of Flint moves to the Karegondi Water Authority (KWA) for their source water. It is important to note that the water from the KWA will be coming from Lake Huron just like the water from the DWSD and the characteristics of the water will be similar.

DRAFT – WORK IN PROGRESS

Protocol for Collecting Water Samples at Schools for Lead Analysis

The following step-by-step procedure will ensure samples are collected in a systematic, consistent manner to provide meaningful results. Following these procedures will allow school and health officials to identify and correct sources of lead in drinking water. The recommended procedures are:

- Conduct an on-site assessment of the building plumbing to identify plumbing components of concern and prioritize sample sites. (Department of Licensing and Regulatory Affairs staff)
- Collect samples from prioritized sites in the sequence outlined by the plumbing assessment (Genesee County Health Department staff)
- Submit samples and appropriate paperwork to the DEQ certified drinking water laboratory (Genesee County Health Department staff)
- DEQ Laboratory performs sample analysis and compiles results.
- DEQ and DHHS jointly interpret sample results.
- DHHS staff provide result interpretations to school officials with any follow-up actions or corrective remedies.

Step 1 – On-Site Plumbing Assessment Preparation

School staff should gather and review any building plumbing records to assist LARA staff in identifying and prioritizing sample sites. Such records include building permits, plumbing permits, record drawings, blueprints, and information about water service lines, drinking water pipes, water fixtures, and plumbing appurtenances. A diagram of the room layout on each floor should also be provided. Answers to the following questions will simplify completion of the on-site plumbing assessment.

- What year was the facility built?
- Has the facility been updated since it was built? If yes, list any changes and the year(s) this work was completed. Examples include new buildings, wings, additions, or renovations to existing buildings. For any construction work completed after 1985, were lead-free plumbing materials and solder used?
- List all plumbing repairs, when the plumbing repair work was done, and where the plumbing repair occurred.
- What material(s) are the drinking water pipes in your facility made of and where are these pipes located? Possible materials include: lead, brass, copper, plastic, galvanized metal and other materials. What solder materials were used to connect sections of drinking water pipes together in your system? Are any water faucets, fittings, or valves made of brass or have any brass parts? Note the locations of these brass materials.
- Count how many of each of the following are used for drinking water: Bubblers, ice makers, water coolers (cooled drinking fountains), sinks, and kitchen taps. Note their location. Include any taps that might be used for making coffee or preparing formula.
- What are the brands and models of water coolers (cooled drinking fountains) in

DRAFT DELIBERATIVE. NOT SUBJECT TO FOIA.

your facility and where is each one located?

- Do any faucets have removable screens or aerators? Have any screens or aerators been taken off and cleaned?
- Have you seen any signs of corrosion, such as water leaks, rust-colored water or water stains?
- Is any electrical equipment grounded to water pipes?
- Are there any previous water testing records?

Step 2 – Schedule On-site Plumbing Assessment with LARA Staff

LARA staff will contact school officials/staff to set a date and time for the plumbing assessment. A school representative familiar with the building layout and plumbing system should accompany LARA staff during the assessment. A room should be made available for reviewing any building records.

Step 3 – Prioritize Sample Sites and Sampling Sequence

All faucets, taps and outlets that are used regularly by students and staff for drinking, cooking, making coffee or food preparation should be sampled. High priority sites include:

- Drinking Fountains (both bubblers and water cooler style).
- Kitchen Sinks, faucets or taps.
- Breakroom, classroom, teachers' lounge or other sinks known to be used or visibly determined to be used for consumption (water glasses or coffeemaker and/or cups are nearby).

LARA staff will assign each sample site an identification (ID) code and determine the order in which each site is to be sampled. This ID code will reflect the type of tap/outlet and its location. The sampling site order must minimize the chance that water in piping is flushed downstream of each site prior to collection of the sample. Therefore, the site closest to the water service line will be first, then each site in order as they get farther away from the service line with the site the farthest away last.

LARA staff will also identify any water coolers that should have been removed in 1988 under the Lead Contamination Control Act that mandated the repair, replacement or recall and refund of drinking water coolers with lead-lined water tanks. LARA staff will confirm if any recalled water coolers are on-site and mark them for removal or replacement.

Step 4 - Labelling the Sample Sites and Labeling of Sample Bottles

Example Coding Scheme for Water Outlets

A drinking water bubbler (DW) on the 2nd floor (02) of the middle school (MID), the 15th outlet counted, might be coded as follows.

- MID- 02- DW-015

Example Outlet Coding Abbreviations

- DW= drinking water bubbler
- WC = water cooler (chiller unit)
- CF = classroom faucet
- KC = kitchen faucet, cold

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- KH = kitchen faucet, hot
- EC = home economics room, cold
- EH = home economics room sink, hot
- BF = bathroom faucet
- NS = nurse's office sink
- SC = service connector

Since more than one sample will be collected from each sample site, a unique sample identifier will be required in addition to the unique outlet code.

The first draw (P), flush (F1) and flush (F2) samples taken for the example outlet would be: MID-02-DW-015-P-01, MID-02-DW-015-F-01, and MID-02-DW-015-F-02.

- P = primary (first draw) sample
- F = flush
- 01 = first flush sample at 30 seconds
- 02 = second flush sample at 2 minutes

Once LARA staff has labelled each outlet, school personnel must ensure that these labels are not removed or altered. Records of each outlet ID code must be kept after sampling is completed so that any future or follow-up sampling can be correlated to the same outlet.

Step 5 – Day Prior to Sample Collection

Each coded outlet where drinking water has not been used for several days should be flushed by school personnel in the afternoon on the day before samples are scheduled to be collected by running each tap for several minutes to clear the faucet.

Following flushing each outlet should be labelled and posted **"DO NOT USE"** so that no water is used before sampling occurs.

In addition, inform all other staff including teachers, maintenance staff, parents and students not to use any water in the building until after sampling has been completed the following morning. Use of bathrooms, etc. prior to sampling will draw fresh water through the piping system altering the effects of stagnation and sample results. Samples will be collected before school opens the next morning.

Step 6 – Sample Collection

Sample bottles will be provided to Genesee County Health Department staff by the Michigan Department of Environmental Quality Drinking Water Laboratory.

1. Three 125 milliliter (mL) samples will be collected at each coded sample site. Sample bottle units for this evaluation/survey are designated 32CC.

2. Collect all water samples before any water is used. Ideally, the water should sit in the pipes unused for at least 8 hours but not more than 18 hours before a sample is collected.

3. Samples should not be collected the morning after a vacation period, weekend or holiday. These results would not be representative of because of the extended period without water use.

4. The three samples collected at each site, first draw, 30 second flush, and 2 minute flush, are to be collected as follows:

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a. After the appropriate 8 – 18 hour stagnation time, place the first bottle under the tap
b. Open the tap to produce a slow, steady "pencil thin" flow and fill the bottle to the appropriate level.
c. Turn off tap. Cap and label the bottle, and record sample information on sample recordkeeping/chain of custody form.
d. Turn on tap again to produce a slow, steady "pencil thin" flow and after 30 seconds, fill the second bottle.
e. Turn off tap. Cap and label bottle, and record sample information on sample recordkeeping/chain of custody form.
f. Turn on tap again to produce a slow, steady "pencil thin" flow and after 2 minutes, fill the third bottle.
g. Turn off tap. Cap, label bottle, and record sample information on sample recordkeeping/chain of custody form.

5. Make sure to mark the bottles as "first draw", "30 sec flush" or "2 min flush" and also indicate this information on the sample submission form. time taken

6. Assign the sample site identification (ID) number to each sample collected. Record this number (including the flush time) on the sample container and submission form.

7. Collect the remainder of the samples (repeating steps 4, 5, and 6) from all designated sites in the pre-determined order as recommended by LARA.

8. Deliver or ship the samples to the lab as instructed.

How to Collect an Initial (First Draw) Sample

- Make sure you have clean hands.
- Complete the sample recording form.
- Only use 32CC containers (125 ml) supplied by the DEQ laboratory.
- Containers should not be opened until you are ready to collect the sample.
- Sampling containers that have been compromised in any way must not be used, e.g., by being touched on the threads or the interior surfaces.
- Keep food and drink away from the sample and its container.
- Make sure no water has been withdrawn from the tap or water fountain before you collect the sample.
- Place the container under the faucet or drinking water fountain that is being tested and collect 125 ml of water.
- If a faucet is being tested make sure you turn on the cold water tap.
- Turn on the water and fill the container without allowing any water to run down the drain.
- Close the container according to the instructions from your certified lab.
- Make sure the container is labeled with the same information from your sample recording form.
- Prepare the container for shipping according to the DEQ lab's instructions.
- Samples must be delivered to the lab within 14 days of collection for proper testing.

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How to Collect Flush Samples

Before the first flush sample is collected, allow the water to run down the drain for 30 seconds. Then collect a sample using the same protocol as above.

Before the second flush sample is collected, allow the water to run down the drain for 2 minutes. Then collect a sample using the same protocol as above.

Step 6 - Laboratory performs analysis

Samples delivered to the DEQ Drinking Water Laboratory will be analyzed in accordance with the Laboratory Services Standard Operating Procedure Document SOP #800 Revision #4 Effective Date 10/2015.

Applicable analytical methods will be in accordance with Method for Determination of Metals in Environmental Samples, Supplement I, U.S. Environmental Protection Agency, Method 200.8, 1999 Revision 5.5.

All Method Detection Limits shall be performed according to the Code of Federal Regulations 40 CFR, Part 136, Appendix B.

Analytical quality control will be in accordance with SOP #800 Revision #4.

Step 7 – Laboratory compiles results

Step 8 - DEQ and DHHS interpret results

DRAFT

Discuss w/ George

Thelen, Mary Beth (DEQ)

From: Krisztian, George (DEQ)
Sent: Thursday, October 15, 2015 7:20 AM
To: Sygo, Jim (DEQ); Wyant, Dan (DEQ); Wurfel, Brad (DEQ); Pallone, Maggie (DEQ); Tommasulo, Karen (DEQ)
Cc: Thelen, Mary Beth (DEQ); Shaler, Karen (DEQ)
Subject: FW: George Krisztian, Lab Director DEQ / Flint Schools

Director and Brad,

I would like to discuss Jim's note below. Perhaps after your trip to Detroit today?

George

George L. Krisztian
Flint Action Plan Coordinator
Laboratory Director
Michigan Department of Environmental Quality
Desk ph (517) 284-6719
Cell ph PPI

10/18 George. This was discussed, correct?

From: Henry, James [mailto:jhenry@gchd.us]
Sent: Wednesday, October 14, 2015 7:05 PM
To: Miller, Mark (DHHS); Krisztian, George (DEQ)
Cc: MVALACAK@gchd.us
Subject: George Krisztian, Lab Director DEQ / Flint Schools

I appreciate the urgency and I'll be back in touch in the morning. I'm hesitant to commit GCHD resources and I want to discuss this further with Mark Valacak.

On several occasions GCHD has experienced lack of cooperation to the point of hindrance from state agencies relative to Flint water investigations. We need a better partnership. I acknowledge that our roles are different. Also, that resources and politics have influence on public health, but this is unacceptable. I apologize that my comments may be misdirected.

Respectfully,
Jim

Jim Henry RS, MBA
Environmental Health Supervisor
Genesee County Health Department www.gchd.us
630 S. Saginaw St., Suite 4
Flint, MI 48502-1540
Phone (810) 257-3618 Fax (810) 257-3125
E-mail jhenry@gchd.us

If so, pls. If not, let me know & I can schedule. TM 10-18

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From: Miller, Mark (DHHS) [mailto:millerm1@michigan.gov]
Sent: Wednesday, October 14, 2015 12:13 PM
To: Henry, James
Cc: Krisztian, George (DEQ)
Subject: George Krisztian, Lab Director DEQ

Jim, if you get a chance can you give George a holler to discuss further school testing? Mark V. said you'd be point on any further school testing.

He's at cell: PPI or krisztiang@michigan.gov

Thanks in advance.

Mark Miller
Director, Local Health Services
Michigan Department of Health & Human Services
201 Townsend, 6th Floor
Lansing MI 48913
(517) 335-8032
millerm1@michigan.gov

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

WG-15J

June 24, 2015

MEMORANDUM

SUBJECT: High Lead Levels in Flint, Michigan – Interim Report

FROM: Miguel A. Del Toral
Regulations Manager, Ground Water and Drinking Water Branch

TO: Thomas Poy
Chief, Ground Water and Drinking Water Branch

The purpose of this interim report is to summarize the available information regarding activities conducted to date in response to high lead levels in drinking water reported by a resident in the City of Flint, Michigan. The final report will be submitted once additional analyses have been completed on pipe and water samples.

Following a change in the water source, the City of Flint has experienced a number of water quality issues resulting in violations of National Primary Drinking Water Regulations (NPDWR) including acute and non-acute Coliform Maximum Contaminant Level (MCL) violations and Total Trihalomethanes (TTHM) MCL violations as follows:

Acute Coliform MCL violation in August 2014
Monthly Coliform MCL violation in August 2014
Monthly Coliform MCL violation in September 2014
Average TTHM MCL violation in December 2014
Average TTHM MCL violation in June 2015

In addition, as of April 30, 2014, when the City of Flint switched from purchasing finished water from the City of Detroit to using the Flint River as their new water source, the City of Flint is no longer providing corrosion control treatment for lead and copper.

A major concern from a public health standpoint is the absence of corrosion control treatment in the City of Flint for mitigating lead and copper levels in the drinking water. Recent drinking water sample results indicate the presence of high lead results

in the drinking water, which is to be expected in a public water system that is not providing corrosion control treatment. The lack of any mitigating treatment for lead is of serious concern for residents that live in homes with lead service lines or partial lead service lines, which are common throughout the City of Flint.

In addition, following the switch to using the Flint River, the City of Flint began adding ferric chloride, a coagulant used to improve the removal of organic matter, as part of the strategy to reduce the TTHM levels. Studies have shown that an increase in the chloride-to-sulfate mass ratio in the water can adversely affect lead levels by increasing the galvanic corrosion of lead in the plumbing network.

Prior to April 30, 2014, the City of Flint purchased finished water from the City of Detroit which contained orthophosphate, a treatment chemical used to control lead and copper levels in the drinking water. When the City of Flint switched to the Flint River as their water source on April 30, 2014, the orthophosphate treatment for lead and copper control was not continued. In effect, the City of Flint stopped providing treatment used to mitigate lead and copper levels in the water. In accordance with the Lead and Copper Rule (LCR), all large systems (serving greater than 50,000 persons) are required to install and maintain corrosion control treatment for lead and copper. In the absence of any corrosion control treatment, lead levels in drinking water can be expected to increase.

The lack of mitigating treatment is especially concerning as the high lead levels will likely not be reflected in the City of Flint's compliance samples due to the sampling procedures used by the City of Flint for collecting compliance samples. The instructions from the City of Flint to residents direct the residents to 'pre-flush' the taps prior to collecting the compliance samples. A copy of the instructions provided by the City of Flint to residents will be included in the final report.

The practice of pre-flushing before collecting compliance samples has been shown to result in the minimization of lead capture and significant underestimation of lead levels in the drinking water. Although this practice is not specifically prohibited by the LCR, it negates the intent of the rule to collect compliance samples under 'worst-case' conditions, which is necessary for statistical validity given the small number of samples collected for lead and copper under the LCR. This is a serious concern as the compliance sampling results which are reported by the City of Flint to residents could provide a false sense of security to the residents of Flint regarding lead levels in the water and may result in residents not taking necessary precautions to protect their families from lead in the drinking water. Our concern regarding the inclusion of 'pre-flushing' in sampling instructions used by public water systems in Michigan has been raised with the Michigan Department of Environmental Quality (MDEQ). The MDEQ has indicated that this practice is not prohibited by the LCR and continues to retain the 'pre-flushing' recommendation in their lead compliance sampling guidance to public water systems in Michigan. A copy of the MDEQ guidance will be included in the final report.

In the case of the Flint resident that contacted U.S. EPA (Ms. Lee-Anne Walters), the initial results from drinking water samples collected by the City of Flint in her home

for lead were 104 ug/L and 397 ug/L. The level of iron in the water also exceeded the capability of the measurement (>3.3 mg/L). The lead results were especially alarming given that the samples were collected using the sampling procedures described above, which minimize the capture of lead. When contacted by U.S. EPA Region 5, the MDEQ indicated that the lead was coming from the Walters' plumbing. Ms. Walters had previously indicated that all of the plumbing in the home was plastic.

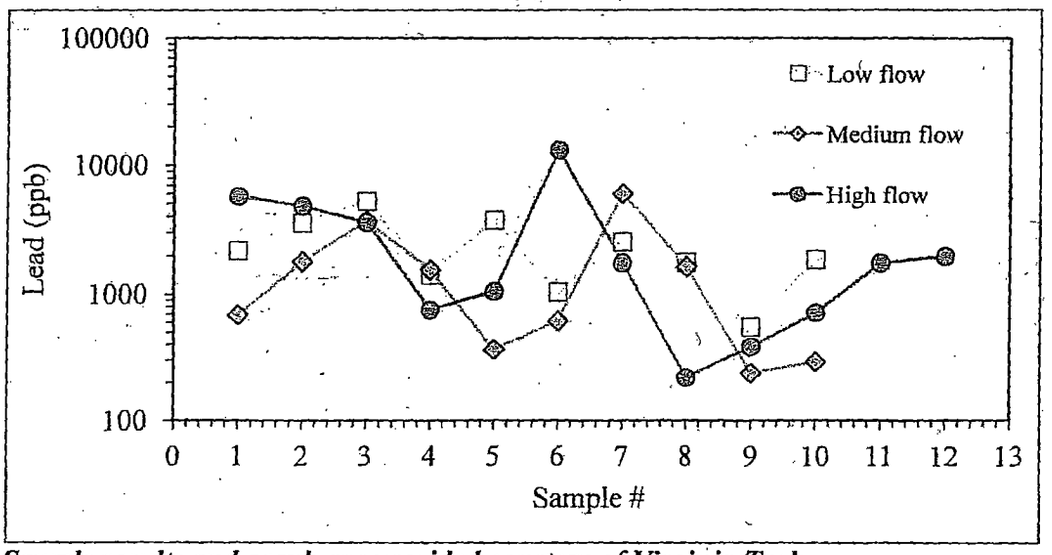
Following the confirmation of the initial high lead results, U.S. EPA Region 5 conducted two visits to the Walters' home on April 27, 2015 and May 6, 2015. Based on an inspection of the plumbing and subsequent sampling conducted at the Walters' residence, it was determined that except for a few minor metallic connectors, all interior plumbing, including the pipes, valves and connectors are made of plastic certified by the National Sanitation Foundation (NSF) for use in drinking water applications. Subsequent sampling showed that the faucets in the home appear to be compliant with the new lead-free requirements and are also not the source for the high lead levels. Our inspection of the interior plumbing and analysis of follow-up sampling results demonstrate that the home plumbing network is not the source of the high lead levels found at the Walters' residence. The photographs and all sampling results will be included in the final report.

Based on the U.S. EPA inspection and documentation of the plastic plumbing at the Walters' residence, it was suspected that the high lead was being introduced into the Walters' home plumbing from outside the home, likely from a lead service line. Three portions of the service line were extracted during a subsequent trip on May 6, 2015 and sent for analysis, when the Walters' service line was replaced. Analyses performed to date indicate that a portion of the service line is made of galvanized iron pipe. Inspection of the remaining portion from the water main to the external shut-off valve confirmed that the portion from the water main to the external shut-off valve is a lead service line.

Ms. Walters has also provided U.S. EPA with medical reports on her child's blood lead testing indicating that the child had a low blood lead level (2 ug/dL) prior to the source water switch and an elevated blood lead level following the switch (6.5 ug/dL). Redacted copies of these reports will also be included in the final report.

Subsequent to the discovery of high lead levels in the Walters' drinking water, the water to the Walters' home was shut off on April 3, 2015. The water was briefly turned back on to collect additional samples on April 28, 2015. Since the water had stagnated for an extended period of time, the kitchen tap was flushed for 25 minutes the night before collecting the samples. Three sets of samples were collected at different flow rates (10 at low flow, 10 at medium flow and 10 at high flow).

The drinking water samples collected from the Walters' residence on April 28, 2015 contained extremely high lead levels, ranging in value from 200 ug/L to 13,200 ug/L (see below).



Sample results and graph are provided courtesy of Virginia Tech

Additional sample results from resident-requested samples have also shown lead levels in excess of the lead action level. As with the samples collected by the City of Flint for compliance, the resident-requested samples are also being collected using the 'pre-flushing', so the lead levels captured in these samples likely do not represent the worst-case lead levels in the water and the actual lead levels at these homes may be much higher.

Pending completion of the final report, my interim recommendations are as follows:

1. The U.S. EPA should follow up with the MDEQ and the City of Flint on the recommendation made by U.S. EPA to MDEQ on June 10, 2015 to offer the City of Flint technical assistance on managing the different water quality issues in Flint, including lead in the drinking water. Although there have been two written assessments regarding water quality and operational issues in Flint at the time of this report, they do not address lead in drinking water. The first is an Operational Evaluation Report (OER) produced in November 2014 by Lockwood, Andrews and Newnam, Inc. to assess the factors contributing to high Total Trihalomethane (TTHM) levels in Flint following the source change. The focus of this report is to identify potential causes and remedial actions for lowering TTHM levels. The second report (Water Quality Report) produced by Veolia for the City of Flint on March 12, 2015, is an assessment of Flint's water quality and operations which provides advice to the City of Flint primarily focused on TTHM control and other operational issues. Both reports were written prior to the recent discovery of high lead results in Flint drinking water. As such, the reports do not take into account the potential effects on lead levels in drinking water.

As previously mentioned, the City of Flint currently has no mitigating treatment for lead and is also planning another source water change in the near future. U.S. EPA's Office of Research and Development in Cincinnati has extensive experience in corrosion and corrosion control treatment and distribution system issues and would be a valuable addition to the drinking water advisory group for the City of Flint. Copies of the qualifications and experience for Michael Schock and Darren Lytle have been forwarded to MDEQ.

2. U.S. EPA should review the compliance status of the City of Flint with respect to whether the system is in violation of the LCR requirement to install and maintain optimal corrosion control and whether the MDEQ is properly implementing the LCR provisions regarding optimal corrosion control treatment requirements for large systems. Pursuant to 40 CFR Section 141.82(i), the EPA Regional Administrator may review treatment determinations made by a State and issue federal treatment determinations consistent with the requirements of the LCR where the Regional Administrator finds: (1) A state has failed to issue a treatment determination by the applicable deadlines; (2) A State has abused its discretion in a substantial number of cases or in cases affecting a substantial population; or (3) The technical aspects of a State's determination would be indefensible in an expected Federal enforcement action taken against a system.

3. The U.S. EPA should review whether relevant resident-requested samples are being included by the City of Flint in calculating the 90th percentile compliance value for lead. Recent drinking water tests conducted at homes in Flint for lead that are not part of the compliance sampling pool have revealed high lead levels in the drinking water. The U.S. EPA memorandum signed on December 23, 2004 provides clarification on compliance determinations and states that customer-requested samples are to be included in the 90th percentile lead compliance calculation where the sampling is conducted during the monitoring period from sites and sampling procedures meeting the LCR criteria. Given the prevalence of lead service lines in the City of Flint, should these sample results be from homes with lead service lines, the sample results would be considered compliance samples under the LCR.

Also attached is a timeline of events for Flint, Michigan. Should you have any questions regarding the information or recommendations provided, please let me know.

cc: Liane Shekter-Smith (MDEQ)
Pat Cook (MDEQ)
Stephen Busch (MDEQ)
Michael Prysby (MDEQ)
Marc Edwards (Virginia Tech)
Michael Schock, EPA-ORD
Darren Lytle, EPA-ORD

Notes on Call with MDEQ on July 21, 2015

MDEQ Implementation of LCR Rule and Flint Issues

Issue #1: Is there a public health concern regarding lead in Flint or other regulatory requirements?

- The 90th percentile results of the 2nd round of monitoring was 11 ppb.
- The population has dropped to under 100,000 and therefore the 1st round of 6-month monitoring was done for 100 samples, but the 2nd round only needed 60 samples.
- Customer-requested samples were included, but MDEQ did not have specifics on how many there were.
- Tinka asked about the timeline for Flint to switch over to the Lake Huron water source. MDEQ said the pipeline is under construction and scheduled to be complete by July 2016. MDEQ expects some delays and thinks a more realistic timeframe is October 2016.
- MDEQ explained that Flint would have 18 months to complete the corrosion control study and the complicating factor of switching over to Lake Huron. Should the corrosion control study be based on the Lake Huron source? MDEQ also explained that since Flint is using Lake Huron water that they would then need to complete 2 more rounds of 6-month monitoring to assess whether any adjustments to the corrosion control treatment was needed.
- MDEQ will be sending a letter to Flint telling them they need to complete a corrosion control study – based on results they are not optimized. Given the timing of completing a corrosion control study and the anticipated switch to Lake Huron water, MDEQ will have discussions with Flint and request that they start corrosion control treatment as soon as possible.
- MDEQ asked for Region 5's opinion on whether the regulations allow for the study requirement for Flint to be waived if MDEQ has Flint start pH adjustments and adding phosphates. Region 5 will look into this and get back to MDEQ with an answer. All acknowledged that if Flint initiated corrosion control treatment and continued to evaluate the system to ensure optimization that these efforts would essentially equate to a corrosion control study.
- The Region raised its concern about looking at treatment more comprehensively to ensure problems with DBPs didn't occur. MDEQ stated that Flint is on the brink of DBP compliance and that bacteriological issues haven't occurred since last year. Any adjustments for corrosion control treatment would need to make sure the other issues weren't exacerbated.
- Region 5 again offered the assistance of ORD staff, Darren Lytle and Mike Schock which MDEQ said they had shared with Flint already.

Issue #2: Discuss optimal corrosion control requirements

Discussion Items:

- MDEQ explained that they did not treat the switch to Flint River water as a "new system", but as a new source. It is their understanding that 2 rounds of 6-month monitoring is still needed to characterize the water quality. They don't know what is optimized until those 2 rounds of 6-month monitoring are completed.

- Region 5 noted that under 141.81(b)(3)(iii) that any system that has been deemed optimized must notify the State of any long-term change in treatment or the addition of a new source. The State must review and approve the change and may require any such system to conduct additional monitoring or other action to ensure that the system maintains minimal levels of corrosion in the distribution system. The State's requirement for 2 additional rounds of 6-month monitoring would fall under the "additional monitoring" prescribed by the State and not the initial 2 rounds of 6-month monitoring for new systems.
- Region 5 explained that they have talked to HQ about the interpretation of regulations and believes that systems that have been deemed optimized need to "maintain" corrosion control. The Region agreed to provide supporting regulatory citations for the language about maintaining corrosion control. Ed Moriarty in OGWDW is also consulting OGC on this topic and the OGC opinion will also be shared.
- MDEQ mentioned that there are other communities that may leave the Detroit system or connect to the new Lake Huron pipeline, but many of those either don't need to treat for corrosion control or will be building new treatment plants. Requirements for maintaining corrosion control for additional communities connecting to the Lake Huron pipeline will be discussed further after receipt of the HQ/OGC opinion.

Issue #3: Discuss Pre-flushing (as time allows)

- Lead compliance sampling procedures in the state of Michigan comply with Federal SDWA requirements which calls for a minimum of 6 hours during which there is no water used from the tap the sample is taken from.
- MDEQ is not interested in changing its position on pre-flushing until new regulations come out. They also pointed out that the pre-flushing instructions are not requirements, but suggestions.
- The Michigan pre-flushing instructions were developed as a way to ensure that sampled faucets were not stagnant for an excessive period of time beyond the targeted 6 hour (i.e., rarely used faucets or when a homeowner has been gone for an extended period of time).

Next Steps:

- **MDEQ will send a letter to Flint regarding the 2 rounds of 6-month monitoring results that exceed 5 ppb and the need for a corrosion control study. They will have discussions with Flint to request that they start corrosion control treatment as soon as possible rather than waiting for the completion of a study that can take 18 months.**
- **MDEQ and the Region were in agreement that it is important to get phosphate addition going in Flint as soon as possible. MDEQ mentioned tapping Mike Shock for help with this in the interim.**
- **Region 5 commented that we now have a path forward for Flint despite a difference of opinion on whether the regulations required Flint to "maintain" corrosion control treatment when they started serving treated water from the Flint River.**
- **MDEQ and Region 5 agreed that after Flint implements corrosion control treatment, when they switch back to Lake Huron water, they will need to continue the corrosion control treatment while conducting monitoring to determine if this treatment is optimized with the new Lake Huron water quality.**

- Region 5 will get back to MDEQ once it gets HQ/OGC's opinion on the need to "maintain" corrosion control treatment once a system is deemed optimized.
- MDEQ and Region 5 agreed that other communities currently implementing corrosion control treatment and change sources will need to continue to provide corrosion control treatment and conduct monitoring to determine whether the treatment is optimized with the new source water quality.
- Region 5 will research and get back to MDEQ on the 141.81 (3)(b)(5) citation and the ability to waive a CCT study.

DRAFT

DRAFT – deliberative not subject to FOIA
TSG Subcommittee Report 10/16/2015

Justification of the drinking water "no corrective action" lead level for use in the Flint school and daycare drinking water sample decision tree

The Michigan Department of Health and Human Services (MDHHS) requested that the Toxic Steering Group (TSG) provide endorsement of a health-based drinking water lead level that would require "no corrective action" to put back into service drinking water faucets and fountains used by Flint school and daycare children. Selection of the "corrective actions" was not included in the charge question and is not discussed in this document. A TSG subcommittee was convened to examine this issue. Subcommittee members included Deb Mackenzie-Taylor (Michigan Department of Environmental Quality [MDEQ]), Robert Sills (MDEQ), Eric Wildfang (MDEQ), Jennifer Gray (MDHHS), Christine Flaga (MDEQ), and Kory Groetsch (MDHHS).

Neither the Centers for Disease Control and Prevention's Agency for Toxic Substances and Disease Registry (ATSDR) nor the U.S. Environmental Protection Agency (EPA) have derived toxicity endpoints (e.g. reference dose, minimal risk level) for lead to be used in risk assessments. Both agencies have stated that no blood lead level has been found to be safe and precautionary actions to reduce exposure to lead, such as running tapwater briefly before use, should always be followed. Due to the pharmacokinetic data and initial acceptable blood lead, the EPA developed a biokinetic model for evaluating lead exposure from multiple media. Lead levels in air, soil, house dust, diet, drinking water, and maternal blood are used to estimate geometric mean blood lead levels for a population of children and the probability that a child would be above a specified blood lead level[1]. The model results are compared to an EPA population health protection goal for young children exposed to lead at residential properties of 5% or lower risk of a child having a blood level greater than the CDC reference value of 5 micrograms lead per deciliter blood (µg/dL)[2]. The model, however, does not include inputs to account for direct paint chip ingestion and assumes that children are not exposed to elevated lead in soil and house dust from lead based paint.

Use of the EPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model

The EPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children version 1.1 Build 11 was used to evaluate exposure to children one year old or younger and children seven years old or younger. Default values were retained unless otherwise noted below. See Table 2-1 in the "User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) Windows©" for the listing of all the default values[3]. Values selected that are more appropriate for a Michigan urban area, Flint, are described briefly below.

[1] The modeling output includes the percent of children in a population that are above a specified blood lead level, but that value can be also be viewed as the probability (risk) that a certain child would be above the specified blood lead level.

[2] As stated on the EPA's Lead at Superfund Sites: Frequent Questions from Risk Assessors on the Integrated Exposure Uptake Biokinetic (IEUBK) Model webpage, found at http://www2.epa.gov/superfund/lead-superfund-sites-frequent-questions-risk-assessors-integrated-exposure-uptake#mean.

[3] The model itself and documentation, including the user's guide for the model can be found at http://www2.epa.gov/superfund/lead-superfund-sites-software-and-users-manuals.

Air data

MDEQ performs monitoring for lead in ambient air (as measured in Total Suspended Particulates; lead [TSP]) at a number of fixed stations in Michigan. Some of these monitoring stations (e.g., in Belding, Port Huron, and Vassar) were established to intentionally capture the influence of specific nearby industrial emissions, while others were established to provide data reflecting the general ambient air lead levels in urban areas. The TSG Subcommittee reviewed the ambient air monitoring data, focusing on urban ambient air lead data that would be representative of contemporary Flint conditions. The most recent MDEQ annual air monitoring report is for 2014[4]. The summary statistics provided in the MDEQ annual air quality reports include 3-month average (mean) levels, the highest value (24-hour sample), and the 2nd highest value (24-hour sample). The National Ambient Air Quality Standard (NAAQS) for lead (0.15 micrograms per cubic meter [$\mu g/m^3$]) has a 3-month averaging time.

Ambient air lead was monitored by MDEQ in Flint (Whaley Park; 3610 Iowa Ave.) until early 2007. The 2005 calendar quarter arithmetic mean values were 0.008, 0.010, 0.011, and 0.012 $\mu g/m^3$. The 2006 calendar quarter arithmetic mean values were 0.005, 0.007, 0.012, and 0.006 $\mu g/m^3$. Although Flint data more recent than 2007 are not available, MDEQ staff considered other urban lead monitoring sites to be fairly representative of Flint conditions. Grand Rapids, Allen Park, and Dearborn each had a highest rolling 3-month arithmetic mean lead (TSP) level of 0.01 $\mu g/m^3$ in 2013; for 2014, these values were 0.01 $\mu g/m^3$ for Grand Rapids and Allen Park and 0.02 $\mu g/m^3$ for Dearborn. These data indicate that the IEUBK model default value of 0.1 $\mu g/m^3$ is not the most appropriate air lead level for Flint, and support a representative value of 0.01 $\mu g/m^3$ for the air data model input assumption. While a slightly higher air lead level was obtained for Dearborn, the small difference between 0.01 and 0.02 $\mu g/m^3$, would not impact model outputs.

Water consumption

The default drinking water intakes are age-dependent and based on national averages[5]. These were updated to match the mean drinking water intakes (direct and indirect) in Table 3-1 from the U.S. EPA Exposure Factors Handbook: 2011 Edition[6].

- 0-1 years old - 0.32 liter/day (L/d) (age-adjusted from the values in Table 3-1)
- 1-2 years old - 0.271 L/d
- 2-3 years old - 0.317 L/d
- 3-4 years old - 0.327 L/d (3 to 6 years old in Table 3-1)
- 4-5 years old - 0.327 L/d (3 to 6 years old in Table 3-1)

[4] The MDEQ 2014 Annual Air Quality Report can be found at http://www.michigan.gov/documents/deq/deq-aqd-amu-2014_Annual_Air_Quality_Report_492732_7.pdf?20151014123800.

[5] Per the "User's Guide for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK) Windows©", "The default consumption rates are age-dependent and based on national averages. These consumption rates should be changed only when valid site-specific monitoring data is available."

[6] The U.S. EPA Exposure Factors Handbook: 2011 Edition can be found at file:///C:/Users/gravj/Downloads/EFH-COMPLETE.PDF.

- 5-6 years old - 0.327 L/d (3 to 6 years old in Table 3-1)
- 6-7 years old - 0.414 L/d (6 to 11 years old in Table 3-1)

Drinking water data for alternate drinking water sources

The alternate drinking water sources used for these modeling runs are listed below with a brief description.

- "Percent of Total Consumed as First Draw" – This value applies to household tap water. This was set to 0% as Genesee County issued an Public Health Emergency Advisory[7] recommending that no one drink the City of Flint water until it has been tested or unless it is being filtered through a filter meeting the National Sanitation Foundation (NSF)/American National Standards Institute (ANSI) standard 53.
- "Concentration of Lead in First Draw (µg/L)" – With the "Percent of Total Consumed as First Draw" set to 0%, this value will not alter the model run output so the default of 4 micrograms per liter (µg/L or parts per billion [ppb]) was retained.
- "Concentration of Lead in Flushed (µg/L)" – This value applies to household tap water. This was set to 1 µg/L (ppb) as filters meeting NSF/ANSI standard 53 are recommended for use in all households. The filters distributed remove greater than 99% of the lead and would result in filtered water containing lead levels of approximately 1 µg/L (ppb) or less.
- "Percentage of Total Consumed from Fountains" – This was set to 50%, as children in school and daycare settings spend around eight hours or more in those locations. Eight hours could be expected to be approximately half of their waking hours in a day. This value also assumes daily intake of drinking water from a school or daycare source. There could be variation in the amount of time children would actually be drinking water from these locations based on involvement in before- or after-school or daycare programs, activities, or events.
- "Concentration of Lead in Fountain Water (µg/L)" – Modeling runs were carried out for every 1 µg/L (ppb) step between zero and 15 µg/L, and also 30 and 100 µg/L (ppb). Modeling runs for the zero to 15 µg/L (ppb) steps were carried out to perform a sensitivity analysis to evaluate how a one µg/L (ppb) change in lead water concentrations alters the outputs of the model. The 30 and 100 µg/L (ppb) levels were included as preliminary representatives of high-end lead levels obtained from school drinking water fountains.

Site-specific soil data

Soil lead levels on residential properties vary greatly[8]. The primary influence is from pre-1978 use of lead paint on the outside of buildings[9,10,11]. Lead-paint was banned in 1978. In addition, the age of

[7] The Genesee County Public Health Emergency Declaration can be found at http://www.gchd.us/docs/public_health_emergency_announcement_10_1_15.pdf.

[8] Datko-Williams, L., A. Wilkie, et al. (2014). "Analysis of U.S. soil lead (Pb) studies from 1970 to 2012." Science of The Total Environment **468-469**: 854-863.

[9] Francek, M. A. (1992). "Soil lead levels in a small town environment: a case study from Mt Pleasant, Michigan." Environ Pollut **76**(3): 251-257.

housing[8,9], paint condition, and distance from the building can greatly impact the concentration of lead in soil. The soil lead concentrations near the foundation of houses with lead paint are frequently over 1,000 ppm[9,11,12,13]. Historic vehicle emissions from leaded gasoline are another source of residential soil lead, so distance from road and traffic volume at the time leaded gasoline was in use are also influential factors on residential soil concentrations[10,11,13]. Other potential influences are fill material (e.g., foundry sand, smelter slag), and/or local industrial emission sources. The highest soil lead concentrations are typically found in urban areas with high population density.

Soil lead data for residential soils in Flint are not currently available. Flint park data and other relevant residential soil lead studies were reviewed to evaluate appropriate surrogate concentrations for this assessment.

The MDEQ[14] reported soil lead concentrations from urban parks including Flint. This data set included 12 sample locations from 10 Flint parks. Surface soil samples were collected at 0-2 inches and subsurface samples were collected at 4-6 inches. This dataset may not adequately represent residential soil samples with a lead paint contribution from buildings. Other studies have shown that open spaces may have much lower soil lead concentrations than areas near residential buildings that were built prior to 1978[11,15]. The geometric mean and geometric mean plus two standard deviation surface soil concentrations (see below) from this Flint park dataset were used for this assessment. The geometric mean plus two standard deviation surface soil concentration represents an upper percentile value that may partially account for the higher soil lead levels expected around buildings with lead paint.

Another data source is from soil samples collected from the Rouge River watershed between 1992 and 2002[16]. This dataset was compiled from MDEQ files and Clayton Group Services files for the Rouge River watershed area in southeast Michigan. Although some data is from Part 201 sites of environmental contamination, most of the samples were collected as a result of other regulatory or real estate due diligence requirements. Sites with known industrial metal sources or that had near surface soil with unknown fill material were excluded from the dataset. The dataset included 28 residential sites that had

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[10] Francek, M. A., B. Makimaa, et al. (1994). "Small town lead levels: a case study from the homes of pre-schoolers in Mt. Pleasant, Michigan." Environ Pollut **84**(2): 159-166.

[11] Schwarz, K., S. T. Pickett, et al. (2012). "The effects of the urban built environment on the spatial distribution of lead in residential soils." Environ Pollut **163**: 32-39.

[12] Andra, S. S., D. Sarkar, et al. (2006). "Lead in Soils in Paint Contaminated Residential Sites at San Antonio, Texas, and Baltimore, Maryland." Bulletin of Environmental Contamination and Toxicology **77**(5): 643-650.

[13] Yesilonis, I. D., R. V. Pouyat, et al. (2008). "Spatial distribution of metals in soils in Baltimore, Maryland: role of native parent material, proximity to major roads, housing age and screening guidelines." Environ Pollut **156**(3): 723-731.

[14] "Draft Michigan Urban Park Topsoil Survey 1997, MDEQ" David Slayton, Office of Waste Management and Radiological Protection, MDEQ

[15] Zahran, S., H. W. Mielke, et al. (2013). "Determining the relative importance of soil sample locations to predict risk of child lead exposure." Environ Int **60**: 7-14.

[16] Murray, K. S., D. T. Rogers, et al. (2004). "Heavy metals in an urban watershed in southeastern Michigan." J Environ Qual **33**(1): 163-172.

535 surface soil samples with data reported for lead. Sample depth was 0 – 0.5 meters. The geometric mean value for residential surface soils reported from this study (see below) was used for this assessment.

The current Part 201 residential direct contact risk-based soil level was also used for this assessment for comparison. This value was generated from the IEUBK model using an acceptable blood lead concentration of 10 µg/dL, a drinking water concentration of 4 µg/L (ppb) and an Michigan-specific average air concentration of 0.04 µg/m^3 were used in the model at the time of criteria development.

Soil levels examined in the model runs were:

- 47.5 parts per million (ppm) – based on the geometric mean of 0-2 inch soil concentrations in Flint urban parks.
- 155 ppm – based on the geometric mean + two standard deviations of 0-2 inch soil concentrations in Flint urban parks.
- 160 ppm – based on the geometric mean for residential surface soil (0-0.5 meter) from Rouge River water shed[17].
- 400 ppm - the MDEQ Residential Direct Contact Risk-Based Screening Level for soil.

Both the residential soil geometric mean from the Rouge River watershed and the upper percentile from the Flint park data appear to represent the best surrogates for residential soil concentrations in Flint for this assessment. Although not from Flint, the Rouge River watershed residential soil data appears to be a fairly robust data set for urban residential soils in Michigan. The Flint park data upper percentile (geometric mean plus two standard deviations is approximately equivalent to the 97.5 percentile) may better account for potential building paint contributions to soil concentrations for urban residential soils than the geometric mean concentration of this dataset. The Flint park upper percentile (155 ppm) reported as two significant digits is equivalent to the Rouge River watershed residential soil lead geometric mean (160 ppm). The soil lead concentration of 160 ppm was selected for use in the calculation of the TSG Subcommittee's recommended health-based drinking water lead levels.

Maternal data

Maternal blood lead levels were changed to 0.8 µg/dL to match the NHANES (2011-2012) geometric mean lead level for women[18].

Blood level of concern (cutoff) for risk estimation

A cutoff value of 5 µg/dL was selected as the current Centers for Disease Control and Prevention blood reference level to identify children with blood lead levels that require follow-up actions. It is based on the blood lead level for the 97.5th percentile for the U.S. population of children, ages one to five[19].

[17] The value is from Table 5 in Murray, K. S., D. T. Rogers, et al. (2004). "Heavy metals in an urban watershed in southeastern Michigan." J Environ Qual **33**(1): 163-172.

[18] The Fourth National Report on Human Exposure to Environmental Chemicals, dated February 2015, can be found at http://www.cdc.gov/biomonitoring/pdf/FourthReport_UpdatedTables_Feb2015.pdf.

Outputs of the modeling runs and recommendation of drinking water lead levels for use during the evaluation of Flint school and daycare drinking water samples

The soil lead level of 160 ppm was selected as being the best surrogate for soil lead levels in the city of Flint. In the event that site-specific soil data is collected, the drinking water lead levels may need to be reevaluated. The entire set of modeling runs and graphs can be found in Attachment 1.

The recommended drinking water lead levels resulted in a 5% risk or lower that a child had a blood lead level above 5 µg/dL. The 5% is an EPA health protection goal for young children exposed to lead at residential properties.

Evaluating school and daycare drinking water samples together

The recommended lead screening level for use while evaluating both school and daycare drinking water samples is 2 µg/L (ppb). This lead level in drinking water samples results in no more than a 5% risk that children age 7 or younger would have blood lead levels above 5 µg/dL.

Age range	Blood lead geometric mean (in micrograms per deciliter [µg/dL])	Risk that a child could have a blood lead level above 5 µg/dL
0-1 year olds	2.308	5.004%
0-7 year olds	2.056	2.934%

Assumptions integral to the use of the health-based school and daycare drinking water lead level
This calculation includes two assumptions. One is that people have lead levels in home drinking water of no more than 1 µg/L (ppb) or are using filters to reduce lead levels to 1 µg/L (ppb) or below. The second is that children do not live in homes with highly elevated levels of lead in home dust or soil. The modeled lead dust levels do not account for lead coming from pre-1978 paint. Eighty-two percent of city of Flint houses were built before 1970[20]. Soil highly impacted with lead paint may have lead levels higher than the 160 ppm used in this calculation. If children are not drinking filtered water at home, are ingesting lead paint chips, or have elevated levels of lead in home dust or soil, a lead level lower than the one recommended above may need to be selected for the evaluation of school and daycare drinking water samples.

Evaluating school and daycare drinking water samples separately

The recommended lead screening level for use while evaluating daycare drinking water samples is

[19] The blood reference level and additional information can be found at http://www.cdc.gov/nceh/lead/ACCLPP/blood_lead_levels.htm.
[20] As determined by the U.S. Census and can be found at http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_14_1YR_S1101&prodType=table.

2 µg/L (ppb). This lead level in drinking water samples results in no more than a 5% risk that children age 1 or younger would have blood lead levels above 5 µg/dL.

Age range	Blood lead geometric mean (in micrograms per deciliter [µg/dL])	Risk that a child could have a blood lead level above 5 µg/dL
0-1 year olds	2.308	5.004%
0-7 year olds	2.056	2.934%

Assumptions integral to the use of the health-based daycare drinking water lead level
This calculation includes two assumptions. One is that people have lead levels in home drinking water of no more than 1 µg/L (ppb) or are using filters to reduce lead levels to 1 µg/L (ppb) or below. The second is that children do not live in homes with highly elevated levels of lead in home dust or soil. The modeled lead dust levels do not account for lead coming from pre-1978 paint. Eighty-two percent of city of Flint houses were built before 1970. Soil highly impacted with lead paint may have lead levels higher than the 160 ppm used in this calculation. If children are not drinking filtered water at home, are ingesting lead paint chips, or have elevated levels of lead in home dust or soil, a lead level lower than the one recommended above may need to be selected for the evaluation of school and daycare drinking water samples.

The recommended lead screening level for use while evaluating K-12 school drinking water samples is 11 µg/L (ppb). This lead level in drinking water samples results in no more than a 5% risk that children age 7 or younger would have blood lead levels above 5 µg/dL. However, when evaluating a population of children age 1 or younger, their risk of having a blood lead level above 5 µg/dL was 8.335%. The 11 µg/L (ppb) screening level is not adequately protective for children under the age of 1.

Age range	Blood lead geometric mean (in micrograms per deciliter [µg/dL])	Risk that a child could have a blood lead level above 5 µg/dL
0-1 year olds	2.61	8.335%
0-7 year olds	2.299	4.917%

Assumptions integral to the use of the health-based school drinking water lead level
This calculation includes two assumptions. One is that people have lead levels in home drinking water of no more than 1 µg/L (ppb) or are using filters to reduce lead levels to 1 µg/L (ppb) or below. The second is that children do not live in homes with highly elevated levels of lead in home dust or soil. The modeled lead dust levels do not account for lead coming from pre-1978 paint. Eighty-two percent of city of Flint houses were built before 1970. Soil highly impacted with lead paint may have lead levels higher than the 160 ppm used in this calculation. If children are not drinking filtered water at home, are ingesting lead paint chips, or have elevated levels of lead in home dust or soil, a lead level lower than the one recommended above may need to be selected for the evaluation of school and daycare drinking water samples.

Attachment 1

IEUBK model outputs - sorted by water lead concentrations

		0-1 year olds		0-7 year olds	
Soil lead levels (ppm)	Fountain water (ppb)	Geometric mean Blood lead level (ug/dL)	%>5 ug/dL	Geometric mean Blood lead level (ug/dL)	%>5 ug/dL
47.6	0	1.184	0.109	0.92	0.016
155.3	0	2.198	4.014	1.958	2.302
160	0	2.24	4.381	2.002	2.573
400	0	4.268	36.82	4.135	34.306
2000	0	13.431	98.224	14.549	98.847
47.6	1	1.22	0.135	0.949	0.02
155.3	1	2.232	4.306	1.985	2.468
160	1	2.274	4.687	2.029	2.75
400	1	4.298	37.376	4.16	34.772
2000	1	13.447	98.235	14.564	98.954
47.6	2	1.257	0.165	0.977	0.026
155.3	2	2.266	4.609	2.012	2.64
160	2	2.308	5.004	2.056	2.934
400	2	4.327	37.929	4.184	35.236
2000	2	13.464	98.247	14.579	98.86
47.6	3	1.293	0.201	1.006	0.032
155.3	3	2.3	4.923	2.039	2.82
160	3	2.342	5.332	2.083	3.126
400	3	4.357	38.48	4.209	35.699
2000	3	13.48	98.258	14.595	98.867
47.6	4	1.33	0.241	1.034	0.04
155.3	4	2.334	5.248	2.067	3.007
160	4	2.376	5.671	2.11	3.324
400	4	4.386	39.029	4.233	36.161
2000	4	13.496	98.269	14.61	98.874
47.6	5	1.366	0.288	1.063	0.049
155.3	5	2.368	5.585	2.094	3.201
160	5	2.41	6.02	2.138	3.53
400	5	4.416	39.575	4.258	36.622
2000	5	13.513	98.28	14.625	98.88
47.6	6	1.402	0.341	1.091	0.06
155.3	6	2.401	5.932	2.121	3.402
160	6	2.443	6.381	2.165	3.743
400	6	4.445	40.118	4.282	37.082
2000	6	13.529	98.29	14.641	98.887
47.6	7	1.438	0.401	1.12	0.073
155.3	7	2.435	6.289	2.148	3.611
160	7	2.477	6.752	2.192	3.964
400	7	4.474	40.659	4.307	37.54
2000	7	13.545	98.301	14.656	98.893
47.6	8	1.474	0.468	1.148	0.087
155.3	8	2.468	6.658	2.175	3.827
160	8	2.51	7.133	2.219	4.191
400	8	4.504	41.196	4.331	37.997

Attachment 1

IEUBK model outputs - sorted by water lead concentrations

		0-1 year olds		0-7 year olds	
Soil lead levels (ppm)	Fountain water (ppb)	Geometric mean Blood lead level (ug/dL)	%>5 ug/dL	Geometric mean Blood lead level (ug/dL)	%>5 ug/dL
2000	8	13.561	98.312	14.671	98.9
47.6	9	1.51	0.542	1.176	0.104
155.3	9	2.502	7.036	2.202	4.05
160	9	2.544	7.524	2.245	4.426
400	9	4.533	41.731	4.355	38.453
2000	9	13.577	98.323	14.686	98.906
47.6	10	1.546	0.625	1.205	0.123
155.3	10	2.535	7.425	2.229	4.28
160	10	2.577	7.925	2.272	4.668
400	10	4.562	42.263	4.38	38.907
2000	10	13.594	98.333	14.702	98.912
47.6	11	1.581	0.715	1.233	0.145
155.3	11	2.569	7.823	2.256	4.518
160	11	2.61	8.335	2.299	4.917
400	11	4.591	42.792	4.404	39.359
2000	11	13.61	98.344	14.717	98.919
47.6	12	1.617	0.815	1.261	0.169
155.3	12	2.602	8.231	2.283	4.762
160	12	2.643	8.755	2.326	5.174
400	12	4.62	43.317	4.428	39.81
2000	12	13.626	98.354	14.732	98.925
47.6	13	1.652	0.924	1.289	0.197
155.3	13	2.635	8.648	2.309	5.014
160	13	2.677	9.183	2.353	5.437
400	13	4.649	43.84	4.453	40.259
2000	13	13.642	98.364	14.747	98.931
47.6	14	1.688	1.043	1.317	0.227
155.3	14	2.668	9.075	2.336	5.273
160	14	2.71	9.621	2.38	5.707
400	14	4.677	44.359	4.477	40.707
2000	14	13.658	98.374	14.763	98.937
47.6	15	1.723	1.171	1.346	0.261
155.3	15	2.701	9.51	2.363	5.539
160	15	2.743	10.067	2.406	5.984
400	15	4.706	44.875	4.501	41.153
2000	15	13.674	98.385	14.778	98.944
47.6	30	2.243	4.406	1.762	1.325
155.3	30	3.188	16.918	2.76	10.313
160	30	3.228	17.593	2.803	10.908
400	30	5.131	52.202	4.861	47.608
2000	30	13.914	98.528	15.005	99.031
47.6	100	4.451	40.23	3.603	24.294
155.3	100	5.267	54.406	4.521	41.511
160	100	5.302	54.957	4.56	42.227

Attachment 1

IEUBK model outputs - sorted by water lead concentrations

		0-1 year olds		0-7 year olds	
Soil lead levels (ppm)	Fountain water (ppb)	Geometric mean Blood lead level (ug/dL)	%>5 ug/dL	Geometric mean Blood lead level (ug/dL)	%>5 ug/dL
400	100	6.967	75.99	6.463	70.746
2000	100	14.992	99.026	16.034	99.342

Attachment 1

IEUBK model outputs - sorted by soil lead level

		0-1 year olds		0-7 year olds	
Soil lead levels (ppm)	Fountain water (ppb)	Geometric mean Blood lead level (ug/dL)	%>5 ug/dL	Geometric mean Blood lead level (ug/dL)	%>5 ug/dL
47.6	0	1.184	0.109	0.92	0.016
47.6	1	1.22	0.135	0.949	0.02
47.6	2	1.257	0.165	0.977	0.026
47.6	3	1.293	0.201	1.006	0.032
47.6	4	1.33	0.241	1.034	0.04
47.6	5	1.366	0.288	1.063	0.049
47.6	6	1.402	0.341	1.091	0.06
47.6	7	1.438	0.401	1.12	0.073
47.6	8	1.474	0.468	1.148	0.087
47.6	9	1.51	0.542	1.176	0.104
47.6	10	1.546	0.625	1.205	0.123
47.6	11	1.581	0.715	1.233	0.145
47.6	12	1.617	0.815	1.261	0.169
47.6	13	1.652	0.924	1.289	0.197
47.6	14	1.688	1.043	1.317	0.227
47.6	15	1.723	1.171	1.346	0.261
47.6	30	2.243	4.406	1.762	1.325
47.6	100	4.451	40.23	3.603	24.294
155.3	0	2.198	4.014	1.958	2.302
155.3	1	2.232	4.306	1.985	2.468
155.3	2	2.266	4.609	2.012	2.64
155.3	3	2.3	4.923	2.039	2.82
155.3	4	2.334	5.248	2.067	3.007
155.3	5	2.368	5.585	2.094	3.201
155.3	6	2.401	5.932	2.121	3.402
155.3	7	2.435	6.289	2.148	3.611
155.3	8	2.468	6.658	2.175	3.827
155.3	9	2.502	7.036	2.202	4.05
155.3	10	2.535	7.425	2.229	4.28
155.3	11	2.569	7.823	2.256	4.518
155.3	12	2.602	8.231	2.283	4.762
155.3	13	2.635	8.648	2.309	5.014
155.3	14	2.668	9.075	2.336	5.273
155.3	15	2.701	9.51	2.363	5.539
155.3	30	3.188	16.918	2.76	10.318
155.3	100	5.267	54.406	4.521	41.511
160	0	2.24	4.381	2.002	2.573
160	1	2.274	4.687	2.029	2.75
160	2	2.308	5.004	2.056	2.934
160	3	2.342	5.332	2.083	3.126
160	4	2.376	5.671	2.11	3.324
160	5	2.41	6.02	2.138	3.53
160	6	2.443	6.381	2.165	3.743
160	7	2.477	6.752	2.192	3.964
160	8	2.51	7.133	2.219	4.191
160	9	2.544	7.524	2.245	4.426
160	10	2.577	7.925	2.272	4.668
160	11	2.61	8.335	2.299	4.917
160	12	2.643	8.755	2.326	5.174
160	13	2.677	9.183	2.353	5.437
160	14	2.71	9.621	2.38	5.707
160	15	2.743	10.067	2.406	5.984
160	30	3.228	17.593	2.803	10.908
160	100	5.302	54.957	4.56	42.227

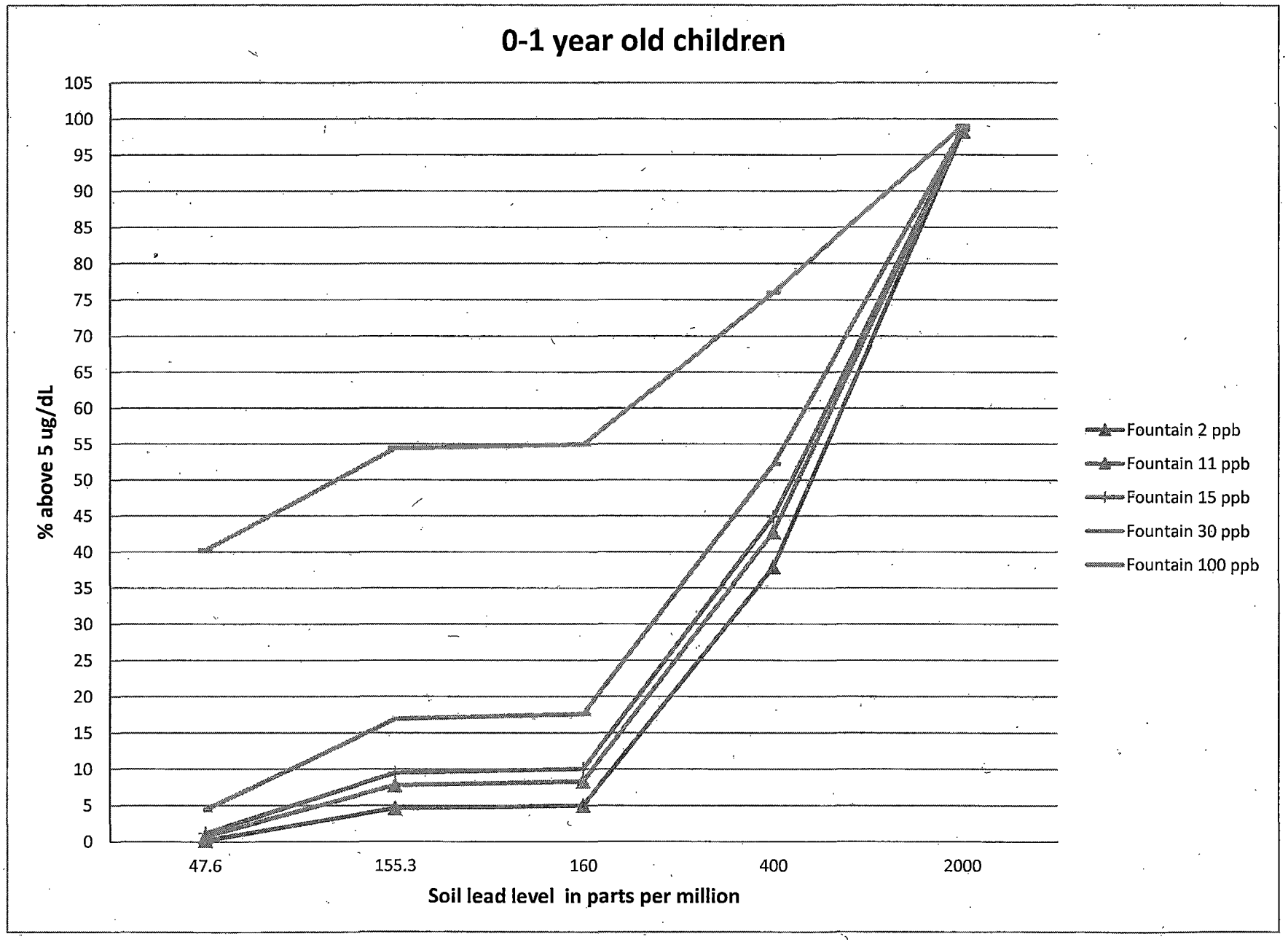
Attachment 1

IEUBK model outputs - sorted by soil lead level

		0-1 year olds		0-7 year olds	
Soil lead levels (ppm)	Fountain water (ppb)	Geometric mean Blood lead level (ug/dL)	%>5 ug/dL	Geometric mean Blood lead level (ug/dL)	%>5 ug/dL
400	0	4.268	36.82	4.135	34.306
400	1	4.298	37.376	4.16	34.772
400	2	4.327	37.929	4.184	35.236
400	3	4.357	38.48	4.209	35.699
400	4	4.386	39.029	4.233	36.161
400	5	4.416	39.575	4.258	36.622
400	6	4.445	40.118	4.282	37.082
400	7	4.474	40.659	4.307	37.54
400	8	4.504	41.196	4.331	37.997
400	9	4.533	41.731	4.355	38.453
400	10	4.562	42.263	4.38	38.907
400	11	4.591	42.792	4.404	39.359
400	12	4.62	43.317	4.428	39.81
400	13	4.649	43.84	4.453	40.259
400	14	4.677	44.359	4.477	40.707
400	15	4.706	44.875	4.501	41.153
400	30	5.131	52.202	4.861	47.608
400	100	6.967	75.99	6.463	70.746
2000	0	13.431	98.224	14.549	98.847
2000	1	13.447	98.235	14.564	98.854
2000	2	13.464	98.247	14.579	98.86
2000	3	13.48	98.258	14.595	98.867
2000	4	13.496	98.269	14.61	98.874
2000	5	13.513	98.28	14.625	98.88
2000	6	13.529	98.29	14.641	98.887
2000	7	13.545	98.301	14.656	98.893
2000	8	13.561	98.312	14.671	98.9
2000	9	13.577	98.323	14.686	98.906
2000	10	13.594	98.333	14.702	98.912
2000	11	13.61	98.344	14.717	98.919
2000	12	13.626	98.354	14.732	98.925
2000	13	13.642	98.364	14.747	98.931
2000	14	13.658	98.374	14.763	98.937
2000	15	13.674	98.385	14.778	98.944
2000	30	13.914	98.528	15.005	99.031
2000	100	14.992	99.026	16.034	99.342

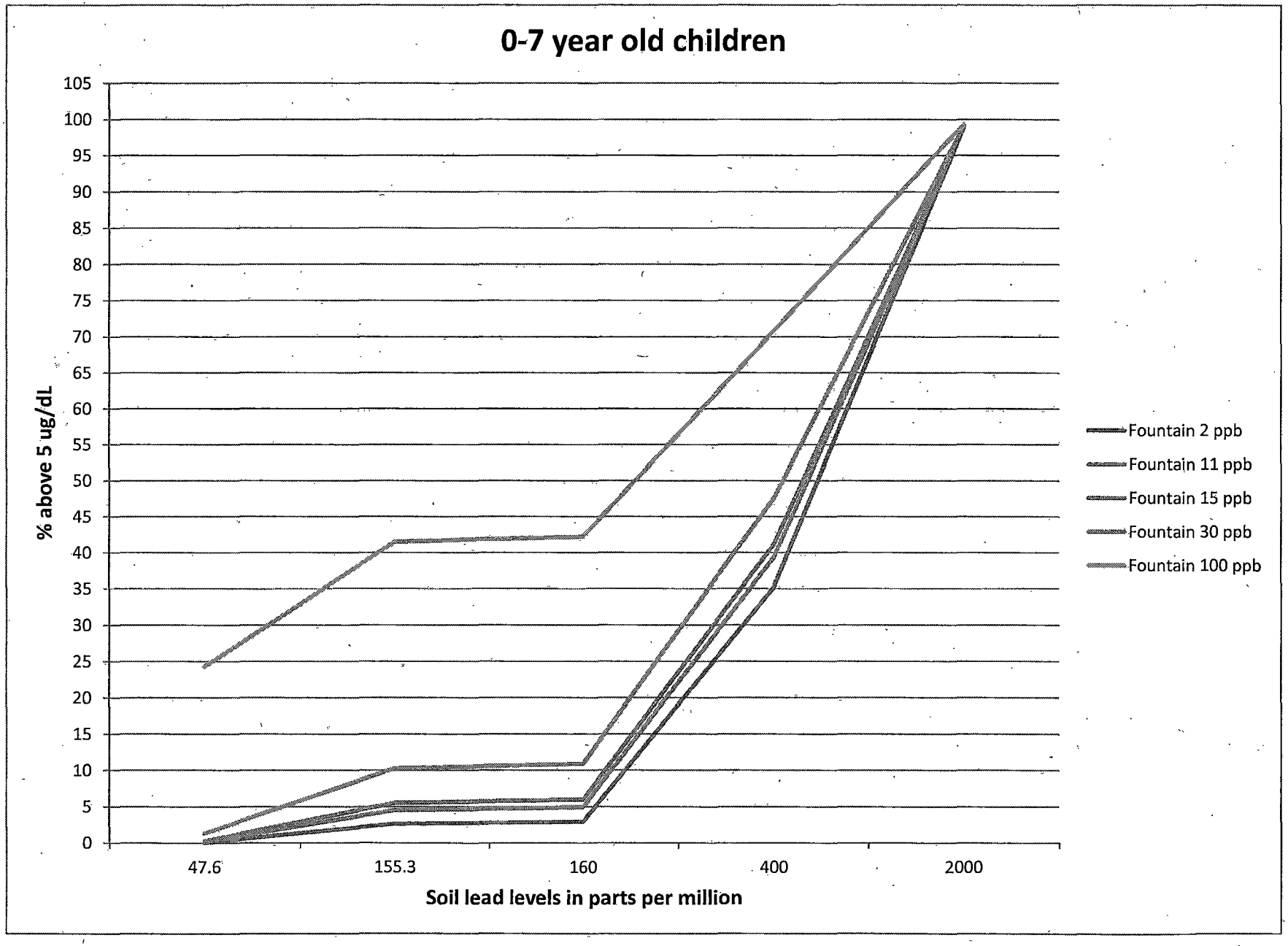
Attachment 1

Graph of IEUBK model outputs for selected water lead levels for 0-1 year old children



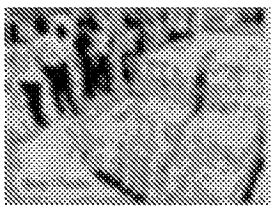
Attachment 1

Graph of IEUBK model outputs for selected water lead levels for 0-7 year old choldren



Chemical testing could have predicted Flint's water crisis

By John Wisely and By Robin Erb, Detroit Free Press 7:14 a.m. EDT October 11, 2015



(Photo: Ryan Garza, Detroit Free Press)

Chemical tests could have predicted the corrosion in the pipes that is now being blamed for endangering the health of thousands of vulnerable Flint residents by elevating lead levels in their water supply, experts say.

As the city scrambles to reconnect to the Detroit water system, the absence of such testing on the Flint River water is one of many missed opportunities that might have lessened or avoided the crisis, they say.

"Any competent person should have seen this water will eat up iron and eat up lead," Marc Edwards, a Virginia Tech professor and national expert on pipe corrosion, told the Free Press. Edwards said his own research shows that Flint River water, without additional controls, corrodes the lead inside pipes at 19 times the rate of water piped from Detroit.



DETROIT FREE PRESS

Why are lead levels in children higher in 2 Flint ZIP codes?

(http://www.freep.com/story/news/local/michigan/2015/10/10/lead-danger-basics/73683934/)

Among red flags that popped up over the last 18 months:

- General Motors announced in October 2014 that it was pulling its engine plant off Flint water after workers there began noticing rust spots on newly machined parts. The city approved letting GM switch to water from Flint Township, but didn't change its own water treatment procedures.

- The University of Michigan-Flint alerted city officials that it found elevated lead levels in its water in January, prompting the school to shut off some some drinking fountains and add water filters to others.

- Testing in the fall of 2014 found E. coli in the city's water system, prompting "boil water" notices. The city's procedures for killing the E. coli produced chemical by-products known as trihalomethanes, which can cause cancer with long-term exposure. The city had to adopt additional measures to reduce them.

"Common sense tells you that the Flint River is not your first choice of drinking water," said Shawn McElmurry, who teaches civil and environmental engineering at Wayne State University and has followed Flint closely.



DETROIT FREE PRESS

Q & A on Flint's water troubles

(http://www.freep.com/story/news/local/michigan/2015/10/10/flint-water-qa/73693500/)

Experts say the testing could have been done before the switch from the Detroit system. But officials from the Michigan Department of Environmental Quality note that that kind of testing isn't required under federal drinking-water rules and has never been done in Michigan. What's more, they said, the Flint River water, treated in the city's plant, was already approved as a backup supply in case of interrupted service from Detroit.

Other experts said the testing is more nuanced, part art and part science. Still, they acknowledge that by examining things such as the acidity of water and other factors, engineers could have estimated how much corrosion to expect once water from the Flint River was pumped into homes and businesses across the city.

"Not every engineer in our field could do it, it's a pretty specialized area," said David Cornwell, a Virginia-based engineering consultant and a technical adviser to the National Drinking Water Advisory Council, a group of experts that works with the Environmental Protection Agency on drinking water issues.

DETROIT FREE PRESS

Flint doctor makes state see light about lead in water



(http://www.freep.com/story/news/local/michigan/2015/10/10/hanna-attisha-profile/73600120/)

The fix now will cost $12 million — a combination of money from the state, the city and the Flint-based non-profit C.S. Mott Foundation, which has pledged $4 million to help pay Detroit for the water while Flint waits to connect to a new water authority in partnership with Genesee County.

Water woes began shortly after switch from Detroit

Flint began using Flint River water as its main supply in April 2014. Before that, it bought Lake Huron water that was treated and delivered by the Detroit Water and Sewerage Department. Detroit ended that deal one day after Flint voted to join Genesee County in forming the Karegnondi Water Authority, which plans to build its own Lake Huron intake and pipe the water to the Flint Water Plant.

Flint officials wanted to remain on Detroit's system, but the two sides couldn't agree on a price and a contract length.

Once the switch to river water was made, the city, which was operating under a state-appointed emergency financial manager, faced one problem after another. Residents packed city council meetings and held protest marches to voice their anger about water quality.

Experts say Flint's lead problems could have been held in check if the city had added phosphates to the water, as Detroit has done for years. The treatment doesn't eliminate lead entirely, but it does form a film over the pipes themselves, effectively sealing in the lead and reducing the amount in the water to acceptable levels.

But when Flint switched to river water, it didn't add phosphates. Instead it added lime to soften the water.

"The lime softening process has the added benefit of some corrosion control," said Liane Smith, chief of Michigan's Office of Drinking Water and Municipal Assistance.

Smith said that once the switch was made, the state began testing for lead and copper, as is required by the federal Environmental Protection Agency.

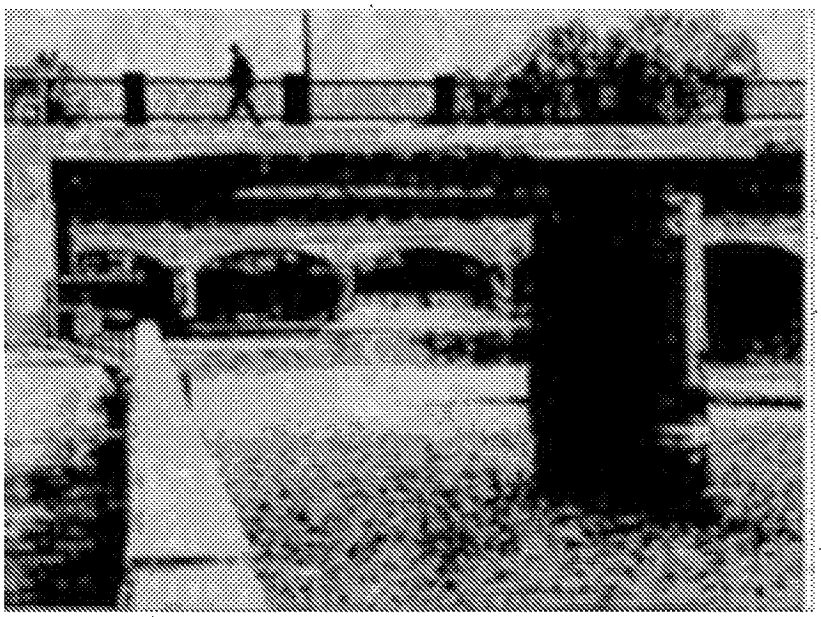
"Any new supply that comes along has to do two six-month rounds of monitoring for lead and copper out in their distribution system," Smith said. If those tests show corrosion, additional steps, such as perhaps adding phosphates, are supposed to be followed.

The first round of testing completed in December 2014 showed lead levels of 6 parts per billion. The second round, completed in June of this year, showed they had almost doubled to 11 parts per billion. The EPA requires a remediation plan when levels reach 15 parts per billion and can demand action even below that mark on systems that serve more than 50,000 people.

Cornwell said phosphates are considered more effective than lime softening and they don't raise treatment costs substantially. But they have side effects, he said.

"The negative is that nobody really likes phosphates out in the environment," he said, noting they can find their way into rivers and lakes, fueling algae blooms such as the ones in Lake Erie.

"There is more to it than saying we're just going to pump phosphates," Cornwell said. "You may have to make other adjustments."



A man crosses a bridge over the Flint River near the Hamilton Dam in downtown Flint on Thursday, Oct. 8, 2015. Flint has been getting its drinking water from the river since last year. *(Photo: Ryan Garza, Detroit Free Press)*

Flint River water a challenge to clean up

Flint River water was always going to pose more treatment challenges than the cold, clear water that comes from the bottom of Lake Huron, experts said.

The river has been marked by decades of industrial pollution. Its tributaries channel farmland run-off into it and its temperature varies by season. Warmer water can promote bacteria growth. All of those factors make treating it to drinking-water standards more difficult.

"The city was doing the best it could" to clean up pollutants, Edwards said, but added that corrosivity was inevitable.

He blamed the problems on a lack of expertise rather than intentional wrongdoing.

"I think it started relatively innocently. They didn't understand testing and they didn't understand corrosivity," he said.

Last month, Edwards' research group released results of corrosion tests it conducted on Flint's water. For the test, researchers used copper pipe with lead solder, which is common in older homes.

The tests showed Flint River water without added phosphates corroded the lead at 19 times the rate of Detroit water. Even when phosphates were added, it corroded at 16 times the rate of the Detroit water.

"From the second it was switched, it was doomed from the lead problem," Edwards said.

When residents began complaining about the water, the city and state should have begun to rethink their testing, Edwards said.

Problems were evident soon after the switch.

In August last year, E. coli was found in the water and residents were urged to boil it before drinking it. The city treated it with disinfectant, but that produced by-products in the water known as trihalomethanes. Long-term exposure to them can cause cancer, so the city began making treatment adjustments.

Then as summer turned to fall, workers at Flint's GM engine plant began seeing rust on newly machined engine parts. GM's lab tests found high levels of chloride in the water used to wash down metal shavings and cool parts heated from the rapid machining action inside the plant, GM spokesman Tom Wickham said.

GM tried to treat the water in the plant. It had drinking water delivered and tankers brought water for operations, Wickham said.

But it eventually sought to connect to Flint Township's water system, which is supplied by Detroit.
In December the connection was finalized and Detroit water began flowing to the plant, via Flint Township.

In January 2015, lead was showing up at the University of Michigan's Flint campus. School leaders become concerned about the water supply after the city issued "boil water" advisories to kill E. coli and realized they'd never done routine, thorough water testing.

Tests in January and February showed elevated levels of lead and other problems in isolated areas —specifically in two infrequently used drinking fountains in two older buildings.

Follow-up testing found other elevated levels of lead, and those sinks and fountains then were either fitted with filters or removed, said Mike Lane, director of the environment, health and safety department

He said officials suspected the problem was in their pipes but notified the city anyway.

In June, Miguel Del Toral of the Environmental Protection Agency drafted an internal memo noting the problems Flint had experienced with E. coli and the by-products of the chemicals used to treat it.

"A major concern from a public health standpoint is lack of corrosion control treatment in the city of Flint for mitigating lead and copper levels in the drinking water," Del Toral wrote.

The memo caused a stir when the American Civil Liberties Union exposed it. But the EPA told the Free Press on Friday that the memo was a draft that was never delivered to MDEQ officials, including Smith, whose names appear on it.

The EPA did say it discussed the concerns raised in the memo with MDEQ officials in July, but the agency did not respond immediately to a request for details.

Leaching lead not unique to Flint

The problem of lead leaching into drinking water isn't unique to Flint. Across Michigan and around the country, pipes that carry water from the mains under the street into homes, businesses and schools often contain lead. Inside homes and business, many older plumbing fixtures and soldered pipes also contain it.

Cornwell said officials from across the nation have formed a working group to review the lead and copper rules and look for ways to improve them. Among the things being considered is a national effort to remove lead pipes from water systems.

But even if a national consensus formed around that idea, the process would take years, Cornwell said. A funding source for such a massive project also would be needed.

Still, he said, removing the pipes is the only surefire way to eliminate lead from the system.

"We can only do so much with water chemistry," he said. "We can only turn the knob so much."

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Contact Robin Erb: 313-222-2708 or rerb@freepress.com.

TIME LINE

April 16, 2013: Flint signs agreement to join the Karegnondi Water Authority.

April 17, 2013: Detroit terminates contract with Flint, giving it one year to find a new water source.

April 24, 2014: Flint switches from Detroit water to Flint River water.

April 30, 2014: Flint closes all valves connecting to Detroit water supply.

June-Sept. 2014: Flint residents complain about smell, taste and discoloration of water.

Dec. 16, 2014: Michigan Department of Environment Quality cites Flint for exceeding limits on disinfection by-products.

Dec. 27, 2014: Flint's General Motors engine plant, citing high chloride levels in the water, switches off its hook-up to Flint, drawing water instead from neighboring Flint Township.

Jan. 9, 2015: Concerned about Flint's water warnings, University of Michigan's Flint campus begins testing its water, detecting lead in isolated,

infrequently used areas.

June 24, 2015: Environmental Protection Agency drafts a report raising concerns about lead in Flint's water system as a result of corrosion. It doesn't send the report, but discusses its concerns with MDEQ officials in July.

Sept. 24, 2015: Dr. Mona Hanna-Attisha releases data showing spike in blood-lead levels in Flint children.

Oct. 2, 2015: State officials tell room packed with reporters that there's a problem with Flint's water.

Read or Share this story: http://on.freep.com/1LoJP7S

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
Pre-1967	Flint Water Treatment Plant in operation using Flint River for drinking water	1
Post-1967	Flint switched to Detroit Water and Sewerage Department for drinking water	None
January 2006	Discussions regarding Karegnondi Water Authority, *Preliminary Long-Term Water Supply for Genesee County*	2
June 25, 2009 September 2009	*Lake Huron Water Supply Study* *Karegnondi Water Authority* Executive Summary and Preliminary Engineering Report	3
March 2013	*Analysis of the Flint River as a Permanent Water Supply for the City of Flint*; Prepared for: City of Flint dated July 2011	4
April 2013	Flint notifies Detroit Water and Sewerage Department of contract discontinuation and joins the Karegnondi Water Authority	5
April 2013	Detroit Water and Sewerage Department sets termination of Flint water service contract to April 17, 2014	6
June 2013	Flint notifies the Department of Environmental Quality of intent to operate Flint Water Treatment Plant full time using Flint River for drinking water	7
April 2014	The Michigan Department of Environmental Quality issues Flint Water Treatment Plant construction permits for full time operation enhancements	9
May 2014	Flint stops purchasing Detroit Water and Sewerage Department water. Starts using the City of Flint Water Treatment Plant and Flint River for drinking water	10
August 2014	Flint *E. coli* bacteria violation, localized system Boil Water Advisory	11
September 2014	Disinfection Byproducts compliance communication; the Michigan Department of Environmental Quality requests preemptive Operational Evaluation	12
September 2014	Flint total coliform bacteria violation, localized system Boil Water Advisory	13

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
October 2014	General Motors announces decision to stop using Flint River as source for production water	14
December 16, 2014	Disinfection Byproducts quarterly violation begins	15
December 31, 2014	1st 6-month round of lead and copper monitoring ends. Results due from Flint to Michigan Department of Environmental Quality on January 10, 2015	None
January 21, 2015	City of Flint Public Meeting regarding disinfection byproducts and bacteria	17
February 26, 2015	E-mail from United States Environmental Protection Agency to Michigan Department of Environmental Quality regarding elevated lead sample	18
February 27, 2015	E-mail from United States Environmental Protection Agency to Michigan Department of Environmental Quality inquiring about Optimized Corrosion Control Treatment	19
February 27, 2015	Michigan Department of Environmental Quality response to United States Environmental Protection Agency email with statement regarding optimized corrosion control program	20
March 5, 2015	2nd Disinfection Byproducts quarterly violation notice	21
March 30, 2015	Michigan Department of Environmental Quality notifies Flint of Lead/Copper Monitoring Results.	16
April 3, 2015	Long Term 2 Enhanced Surface Water Treatment Rule Letter	22
April 6, 2015	Flint proposes installation of Granular Activated Carbon Filter media to reduce disinfection byproducts	23
April 23, 2015	United States Environmental Protection Agency e-mail to Michigan Department of Environmental Quality regarding corrosion control treatment	24
April 24, 2015 May 1, 2015	Michigan Department of Environmental Quality responds to United States Environmental Protection Agency regarding corrosion control treatment	25

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
April 27, 2015	United States Environmental Protection Agency provided bottles to 212 Browning for lead/copper analyses	26
May 6, 2015	Lead service line replaced at 212 Browning. United States Environmental Protection Agency on-site	27
May 28, 2015	Internal United States Environmental Protection Agency e-mail regarding results at 212 Browning	29
June 9, 2015	3rd Disinfection Byproducts quarterly violation notice	30
June 10, 2015	Semi-Annual Conference call with United States Environmental Protection Agency	31
June 30, 2015	E-mail from United States Environmental Protection Agency scheduling conference call on July 21, 2015 regarding elevated lead result and concerns regarding corrosion control	32
June 30, 2015	2nd 6-month round of lead and copper monitoring ends. Results due from Flint to Michigan Department of Environmental Quality on July 10, 2015	None
July 9, 2015	Michigan Department of Environmental Quality informed that United States Environmental Protection Agency draft internal memo is on ACLU website	33
July 14, 2015	Michigan Department of Environmental Quality issues construction permit to Flint for Granular Activated Carbon filter media W151055	34
July 21, 2015	Conference call with United States Environmental Protection Agency (Lead and Copper Rule implementation and Flint) during which it informs Michigan Department of Environmental Quality its interpretation of Lead and Copper Rule	35
July 24, 2015	Michigan Department of Environmental Quality e-mail and draft letter 90th percentile lead determination = 11 parts per billion and City of Flint requirement to add corrosion control treatment	36

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
July 28, 2015	Michigan Department of Environmental Quality received blood lead level information from Michigan Department of Health and Human Services indicating that results since the switch to the Flint River are consistent with past years seasonal variations	37
August 4, 2015	Meeting with city representatives at Governor's office	38
August 17, 2015	Michigan Department of Environmental Quality notifies Flint of lead/copper monitoring results and requires City to install corrosion control treatment	39
August 23, 2015	Michigan Department of Environmental Quality notified by an external party that a water quality study was about to begin in Flint	40
September 2, 2015	Disinfection Byproducts return to compliance	43
September 11, 2015	United States Environmental Protection Agency e-mail confirming that Michigan Department of Environmental Quality was never sent the draft June 24, 2015 memo	44
September 21, 2015	Meeting with Congressional representatives, legislators, United States Environmental Protection Agency and Michigan Department of Environmental Quality to discuss issues with water quality in Flint	45
September 22, 2015	Meeting/Conference call with Michigan Department of Health and Human Services, Genesee County Health Department, and Michigan Department of Environmental Quality to discuss lead education/outreach	46
September 24, 2015	Hurley Children's Hospital data reveals elevated blood lead levels in Flint children	47
September 24, 2015	Michigan Department of Health and Human Services response affirms State blood lead level data is more comprehensive than Hurley Hospital data	None

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
September 25, 2015	Flint issues Lead Advisory regarding drinking water	48
October 1, 2015	State Chief Medical Officer confirms Hurley blood lead level data	None
October 1, 2015	Genesee County Health Department issues "Do Not Drink" Advisory	49
October 2, 2015	Michigan Department of Environmental Quality and Michigan Department of Health and Human Services press conference. Governor's Flint Action Plan announced.	50
October 2, 2015	Genesee County Health Department school screening water samples collected for lead analysis	51
October 8, 2015	Governor Press Conference: Flint to reconnect to Great Lakes Water Authority/Detroit Water and Sewerage Department	52
October 15, 2015	State Legislature authorizes a $9 million to assist the City of Flint to pay for the return to the Detroit water system and to fund staff at schools to gauge lead exposure	None
October 16, 2015	First weekly coordination meeting held between the City of Flint and state agencies	None
October 16, 2015	Michigan Department of Environmental Quality meets with Flint Schools Superintendent and Genesee County Health Department	None
October 16, 2015	Flint switches back to Detroit Water and Sewerage Department for water	53
October 21, 2015	Governor Snyder announces formation of Flint Water Task Force to complete an After Action Review	None
October 28, 2015	Michigan Department of Environmental Quality issues construction permit for additional corrosion control treatment	54
October 30, 2015	Michigan Department of Environmental Quality letter to Flint regarding corrosion control treatment operation	55

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
November 3, 2015	United States Environmental Protection Agency Memorandum regarding "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems"	56
November 4, 2015	United States Environmental Protection Agency Memorandum regarding "Transmittal of Final Report – High Lead at Three Residences in Flint, Michigan"	57
Mid-Late 2016	Planned connection to Karegnondi Water Authority (Lake Huron water to Flint Water Treatment Plant)	None

Gentlemen,
I understand the demands being placed on you today regarding the vote in Lansing on the water funding, so thanks for trying to accommodate us with this alternate approach.
I'm interested in giving you the opportunity to respond to the most critical evaluations of the state's handling of water issues in Flint. To do that, I think it would be helpful to break the subjects into time periods: decisions made before the switch to the Flint River and decisions made after the switch.

Before the switch...

1. With Flint under the control of an emergency manager in the years leading up to the use of the Flint River as a water source, what role did DEQ play in arriving at the decision?

   DEQ offered technical counsel on what it would take for the city to use the river as its primary water source. Required facility updates, etc.

   Were the department's experts consulted on issues such as: the feasibility of the river as a drinking water source, the river water's effect on Flint's delivery infrastructure, etc.?

   No.

   Was the department pressured in any way to sign off on this arrangement from higher up – the governor's office?

   Unequivocally, no. And we did not have 'signoff authority'. This was a local decision. DEQ's role was to make sure the finished product meets safe drinking water standards.

2. Was the Flint River's water tested prior to the decision to switch to determine several key factors? Those include: compatibility with Flint's delivery system, the need for corrosion controls, etc.?
   Not aware that the city tested for those things. Again, out of 90 + contaminants monitored, corrosivity is not a regulated aspect of drinking water under state and federal law.

3. What legal responsibility did the state have in requiring corrosion controls for the Flint River water? Did the state meet its responsibility for that requirement? This is the question we believe will be addressed

4. Detroit Water and Sewerage Department officials used phosphates for corrosion control when running its water through Flint's infrastructure for years prior to the switch. Why was phosphate not included from the start as a protective measure? Was a cost estimate done on the use of phosphates and was that part of the decision-making process on whether to use it or not?

5. Dan, you've stated in the past that lime was utilized as a form of corrosion control when the switch was made. Marc Edwards has publicly suggested that the use of lime, when coupled with the addition of acid to reduce ph, actually increases the corrosivity of the water. Was the effectiveness/safety of lime as corrosion control tested ahead of time? If not, why?

After the switch...

1. From the outset, there were complaints about the water, ranging from contact rashes and itching, to taste, smell and discoloration. And early on, the city had to deal with Trihalomethane problems. Should these complications have been seen as an indication that there may have been other problems? Should it have triggered a more thorough investigation of the water situation in Flint which might have led you to the lead problem?

2. In October 2014, General Motors opted to go off Flint's water system because concerns about its corrosive effect on metal. Should that have been an indication that a greater investigation into the water's safety should have been conducted? If it's not good for GM, should someone have asked if it was good for residents?

3. In December 2014, January 2015, you had the results of six-months of water sampling which produced a reading of 6 ppb – just over the acceptable level of 5 ppb. Should that alone have triggered some additional system-wide investigation?

4. In February, water samples were taken at the home of Lee-Anne Walters that showed extremely high amounts of lead in her drinking water. I realize the physical dimensions of that home's tie-in line may

have played a role in those readings, but again, in the context of what was happening, should that have triggered a system-wide investigation?

5. As evidenced by the Pat Cook email dated May 1, 2015, it appears EPA's Miguel Del Toral had unofficially expressed his concerns about the river water interacting with the system some time in April. His follow-up unofficial memorandum was dated June 24. So at this point, an expert on drinking water is telling DEQ there is a potential problem here. Why did this not trigger a closer look?

6. Around that same time, Virginia Tech's Edwards makes public his findings about the heightened corrosivity of the Flint River water. Why wasn't this a trigger for a possible system-wide investigation? In retrospect, was the state's public response to those findings acceptable?

7. Dr. Hanna-Attisha's findings that Flint children were exhibiting higher-than-expected levels of lead in blood tests are released on Sept. 24. In response, Brad's response was that the water is "safe" and that it was "meeting state and federal standards." How do you assess that response now?

8. How do you respond to people who see the state's handling of Flint's water issues as a failure that put the public's health at risk? And has that handling compromised the director and department spokesman in their ability to do their jobs?

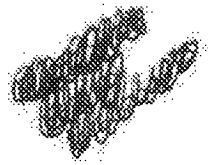
Michigan Department of Health and Human Services (MDHHS)
Blood Lead Level Test Results for Flint Zip Codes 48501-48507
Genesee County, and the State of Michigan
Summary as of November 13, 2015

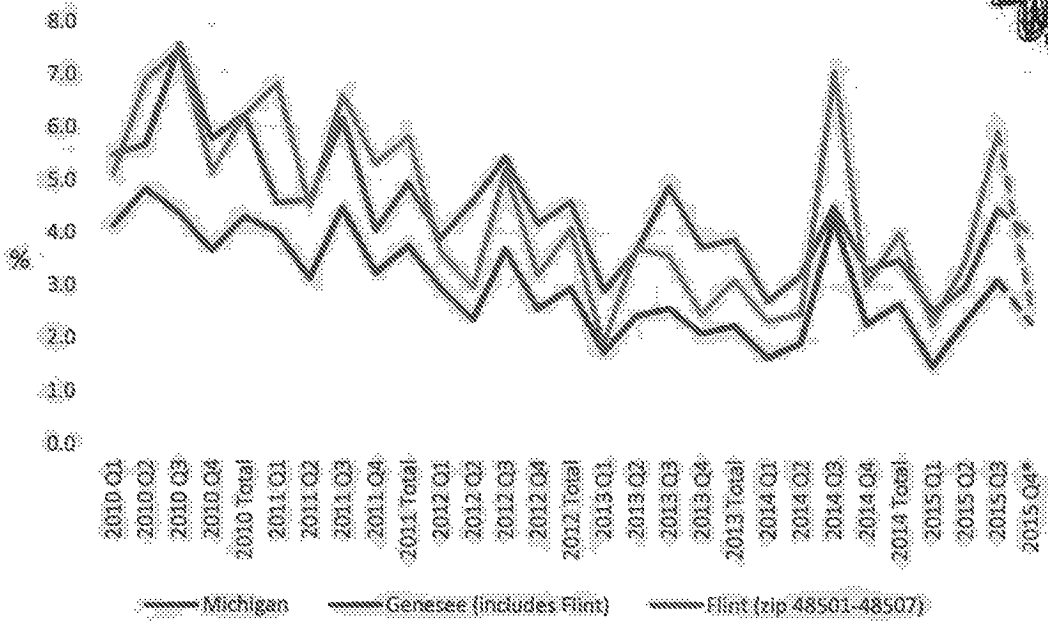
Executive Summary

This report is generated by MDHHS to track Blood Lead Level test results in Flint, Michigan.

- Counts on this report include both capillary and venous blood tests. People who have had multiple tests are counted only once per year.
- Since 10/1/2015, an additional 1,361 people have been tested in Flint.
- Continued testing efforts by Genesee County Health Department, MDHHS and local medical personnel have identified 21 children with blood lead levels greater than or equal to 5µg/dL (micrograms per deciliter) since 10/1/2015.
- Three percent of the children younger than 6 years old tested since 10/1/2015 have had blood lead levels greater than or equal to 5µg/dL.
- Additional testing is ongoing. Counts will vary as new results are added.

Incidence of elevated blood lead > = 5 mcg/dl among children < 6 years of age by quarter, 2010- 2015





Deduplicated by year, retains test during the time period.
*Data for Q4 2015 are incomplete

** Data for Quarter 4 of 2015 are incomplete and subject to change*

	Children younger than 6 Years Old			Children 6 to 17 Years Old		
	Michigan	Genesee County	Flint 48501-48507	Michigan	Genesee County	Flint 48501-48507
Total tested for lead 1/1/2010 to 12/31/2010:	152,608	6,932	3,560	17,963	867	463
Number of test results ≥5µg/dL 1/1/2010 to 12/31/10:	9,509 6.2%	298 4.3%	222 6.2%	907 5.0%	25 2.9%	20 4.3%
Total tested for lead from 1/1/2011 to 12/31/2011:	149,420	6,667	3,093	15,725	1,038	544
Number of test results ≥5µg/dL 1/1/2011 to 12/31/11:	7,392 4.9%	250 3.7%	180 5.8%	651 4.1%	20 1.9%	15 2.8%
Total tested for lead 1/1/2012 to 12/31/2012:	146,142	7,008	3,112	15,460	1,386	630
Number of test results ≥5µg/dL 1/1/2012 to 12/31/12:	6,704 4.6%	206 2.9%	127 4.1%	478 3.1%	17 1.2%	12 1.9%
Total tested for lead 1/1/2013 to 12/31/2013:	145,813	6,986	3,077	13,897	1,241	566
Number of test results ≥5µg/dL 1/1/2013 to 12/31/13:	5,647 3.9%	156 2.2%	95 3.1%	342 2.5%	9 0.7%	4 0.7%
Total tested for lead 1/1/2014 to 12/31/2014:	141,355	6,690	3,045	12,936	913	428
Number of test results ≥5µg/dL 1/1/2014 to 12/31/14:	4,948 3.5%	178 2.7%	122 4.0%	386 3.0%	6 0.7%	5 1.2%
Total tested for lead 1/1/2015 to 11/13/2015:	120,699	5,778	2,704	10,841	1,197	765
Number of test results ≥5µg/dL 1/1/2015 to 11/13/2015:	4,200 3.5%	149 2.6%	101 3.7%	309 2.8%	10 0.8%	8 1.0%
Total tested for lead 10/1/2015 to 11/13/2015:	14,593	957	560	1,412	502	409
Number of test results ≥5µg/dL 10/1/2015 to 11/13/2015:	583 4.0%	22 2.3%	15 2.7%	38 2.7%	6 1.2%	6 1.5%

** Data for Quarter 4 of 2015 are incomplete and subject to change*

	Adults 18 Years and Older			Total Number of People of All Ages Tested		
	Michigan	Genesee County	Flint 48501-48507	Michigan	Genesee County	Flint 48501-48507
Total tested for lead 1/1/2010 to 12/31/2010:	13,853	602	195	184,424	8,401	4,218
Number of test results ≥5µg/dL 1/1/2010 to 12/31/10:	1,462 10.6%	42 7.0%	18 9.2%	11,878 6.4%	365 4.3%	260 6.2%
Total tested for lead 1/1/2011 to 12/31/2011:	13,259	542	139	178,404	8,247	2,726
Number of test results ≥5µg/dL 1/1/2011 to 12/31/11:	1,369 10.3%	44 8.1%	16 11.5%	9,412 5.3%	314 3.8%	211 7.7%
Total tested for lead 1/1/2012 to 12/31/2012:	13,059	556	155	174,661	8,950	3,907
Number of test results ≥5µg/dL 1/1/2012 to 12/31/12:	1,415 10.8%	33 5.9%	11 7.1%	8,597 4.9%	256 2.9%	150 3.8%
Total tested for lead 1/1/2013 to 12/31/2013:	12,199	498	136	171,909	8,725	3,779
Number of test results ≥5µg/dL 1/1/2013 to 12/31/13:	1,499 12.3%	54 10.8%	16 11.8%	7,488 4.4%	219 2.5%	115 3.0%
Total tested for lead 1/1/2014 to 12/31/2014:	12,684	441	112	166,975	8,044	3,585
Number of test results ≥5µg/dL 1/1/2014 to 12/31/14:	1,422 11.2%	44 10.0%	12 10.7%	6,756 4.0%	228 2.8%	139 3.9%
Total tested for lead 1/1/2015 to 11/13/2015:	11,685	860	526	143,225 [illegible]	7,835 [illegible]	3,995
Number of test results ≥5µg/dL 1/1/2015 to 11/13/2015:	1,195 10.2%	30 3.5%	15 2.9%	5,704 4.0%	204 2.6%	124 3.1%
Total tested for lead 10/1/2015 to 11/13/2015:	1,615	483	392	17,620	1,942	1,361
Number of test results ≥5µg/dL 10/1/2015 to 11/13/2015:	160 9.9%	11 2.3%	9 2.3%	781 4.4%	44 2.3%	30 2.2%

same 2.3% (was 22%)

** Data for Quarter 4 of 2015 are incomplete and subject to change*

Shekter Smith, Liane (DEQ)

From: Krisztian, George (DEQ)
Sent: Monday, October 12, 2015 9:34 AM
To: Shekter Smith, Liane (DEQ)
Subject: Preliminary and Deliberative: No Subject to FOIA

Importance: High

Hi Liane,

I am prepping the Director for an interview today.

Can you please tell me:

What was done before the switch to the Flint River to determine its characteristics? i.e. what sort of testing was done on it?

I am looking at just facts, this question is not meant put you in a difficult position. Please feel free to call me

Thank you!
George

George L. Krisztian
Flint Action Plan Coordinator
Laboratory Director
Michigan Depatment of Environmental Quality
Desk ph (517) 284-6719
Cell ph **PPI**

Complete Nets
Retry Mod
Vacs

Testing on Mint River pumps switch from
pump to the river

DRAW water (pre-treatment)

- Turbidity
- Fluoride
- pH
- Hardness
- Alkalinity
- Chloride
- Total coliform/EPC
- Temp

} unit process monitoring reported on EA



Test-run reports
Done quarterly for plant operating but run as back up energy standby test condition.

② Treated water from quarterly test-runs typ. 1 week duration

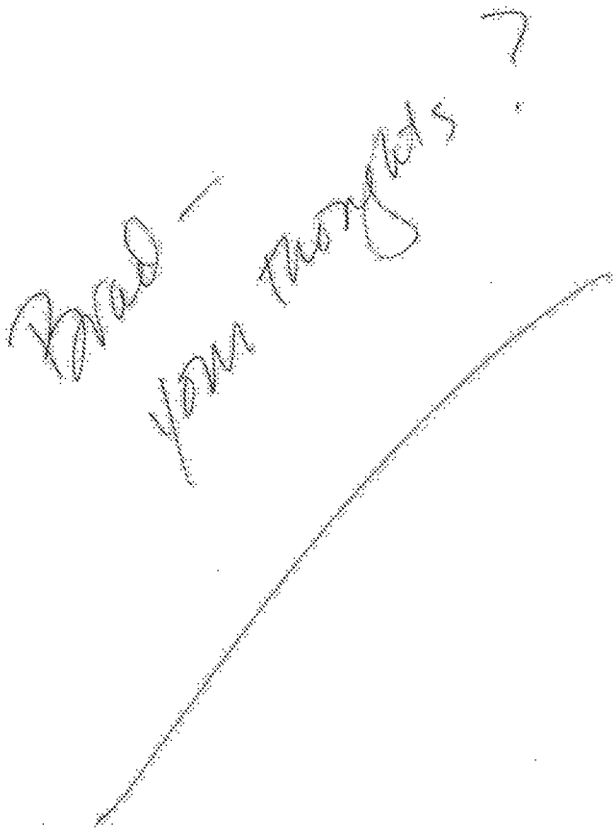
- complete nets
- pesticides
- herbicides
- VOCs
- P-chem

} essentially the "unit 37" across the cycle

In addition to the unit 37, the additional O_3 plant trip and parameters were monitored: ⇒ from test run reports
Fluoride, turbidity, Total coliform, EPC, temp
fluoride
chlorine
pH
Hardness
Alk
Chloride

9. To which mistake did the DEQ Department Director refer to regarding DEQ's actions on October 18, 2015?

There is ambiguity about how the federal Lead and Copper Rule applies to the situation in Flint where the City switched to the Flint River as a water source. Upon immediate analysis, it appeared that the DEQ may not have followed the appropriate protocol specified in the LCR for corrosion control treatment for cities of with populations of greater than 50,000. Upon further review of the LCR, on November 3, 2015, the US EPA issued updated guidance on the appropriate optimal corrosion control treatment for large water systems switching from purchased treated water to a new source, acknowledging that there were "differing possible interpretations" of the LCR for this circumstance. The DEQ Director respects those voices that raised the issue of lead exposure in Flint and apologizes to those who may have believed that the DEQ's tone discredited their concerns. The DEQ will actively pursue clarifying amendments to the LCR to prevent such situations in other cities in the future.



The DEQ and the DLARA also have conducted sampling at SCHOOLS, but results are not yet complete. Additionally, the state will test every other school in Flint Community Schools, as well as any other charter or private school in the city. Interested schools should contact George Krisztian at krisztiang@michigan.gov.

Homeowner and other customer-requested testing results

Results from the # of homes, businesses, schools and other facilities that took advantage of free water testing through the state showed similar localized results. More than 75 percent of the samples processed demonstrated lead results of ~~less than~~ 5 parts per billion, and more than # percent demonstrated lead results of less than 15 parts per billion



In ZIP code #, data…

As a whole, this data suggests that while some homes experience elevated lead level results due to lead service lines or in-home plumbing, many other homes experience little to no lead. This can make it difficult for homeowners and businesses to predict their lead exposure. The best thing residents concerned about lead in their home can do is get their water tested. Testing is available for free by contacting the Flint Water Plant at 810-787-6537 and pressing 1, or by emailing flintwater@cityofflint.com.

For more information about water samples received through the state's free testing program, visit www.michigan.gov/flintwater.

How school sampling was conducted

To conduct this comprehensive sampling, the DEQ and Michigan Department of Licensing and Regulatory Affairs began on Oct. 23 with a thorough plumbing assessment of the school to gain a comprehensive understanding of how water moves through the building and what types of plumbing materials are used. The assessment also identified 31 faucets or fountains in the school that provide water for drinking, cooking and/or food preparation.

On Oct. 24, the DEQ and DLARA took four, 125-milliliter samples from each of the 31 identified faucets and fountains. The first two samples were taken immediately after turning on the faucet, followed by a 30-second flush and then the third sample, followed by a 2-minute flush and then the fourth sample. These samples provided information on the impact of any lead sources in or around each specific faucet and fountain as well as its connecting plumbing.

On Oct. 31, the DEQ and DLARA took an additional 10 samples from three sites in the school. These 1-liter samples were taken consecutively, and provided information about the impact of any lead sources deep in the building's plumbing.

Gov Date 10/13/15

Flint Drinking Water Action Plan Update

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

October 12, 2015, notes from conference call among DEQ, DLARA, and DHHS:

- Flint is in the process of prioritizing schools; should have list by COB October 13.
- Flint is sending out 3rd quarter reports incorporating input from the Technical Advisory Committee.
- Trying to set up weekly meetings with agency points of contact from DEQ, DLARA, and DHHS.
- DEQ is setting up weekly meetings with Mayor Dayne Walling. DHHS and DLARA wish to be included?
- DEQ is setting up a tour of the Flint Water Treatment Plant. Inclusion?
- Initial After Action Plan meeting to be scheduled the week of October 12 (on October 15?) framing issues that we need to deal with.
- Daily reports to the Governor.

Prepared by: George Krisztian, Flint Action Plan Coordinator
Laboratory Director
Department of Environmental Quality
Telephone: 517-284-6719
Cell: PPI
October 13, 2015

Prysby, Mike (DEQ)

From:	Robert Bincsik <rbincsik@cityofflint.com>
Sent:	Thursday, February 12, 2015 4:05 PM
To:	Prysby, Mike (DEQ)
Cc:	bwright@cityofflint.com
Subject:	Re: Residential customers

Mike here are the latest numbers from billing.
Commercial Active 4473.
Residential 24599

On Thu, Feb 12, 2015 at 11:44 AM, Prysby, Mike (DEQ) <PRYSBYM@michigan.gov> wrote:

Brent, Rob....

I need Flint's most recent number of active residential service connections as part of updating MDEQ's estimated population served. Also, add in commercial and industrial accounts; however, keep them separate. Thanks.

Michael Prysby, P.E.

District Engineer

Office of Drinking Water and Municipal Assistance

517 290-8817

--
Thank you,

Robert Bincsik
Water Distribution and
Sewer Maintenance Supervisor
City of Flint
3310 E. Court Street
Flint, MI 48506
Ph: 810.766.7202 ext. 3413

TOTAL =

346 3059 ≤ 5 ppb

≤ 15 ppb

577 673 soils ~ 3900 SAMPLES

~ 93 % ≤ 15PPB

~ 84 % ≤ 5PPB

617 226 2002

6172611496

~1100 Homes Visited

3-5 lead lines identified

~95 Homes Declined

98283
98466

534/672 79.5% ≤5PPB

622/672 92.6% ≤15PPB

90th = 11 PPB

Median = 2PPB

Through 12/29



FRIDAY JANUARY 29, 2016
FLINT CITY HALL

WE WILL BE REACHING OUT TO THOSE INDIVIDUALS WITH COPPER LEVELS OVER 1.3 PPM TO PROVIDE ADDITIONAL GUIDANCE.

MATT DOLAN 1:00 PM

→ CORROSIVE TESTING -

→ HOME TESTING
ICE ALL THE WAY TO THE MAIN

EPA
- LOOKING MORE CLOSELY AT PLUMBING AT HOMES WITH HIGH LEVELS

5 POING TESTING
RES
- FOOD
- EBL
- SCHOOLS
- SENTINEL

CITY → WATER QUALITY PARAMETERS







RESIDENTIAL PB & Cu TESTING

4924 TOTAL SAMPLES

4616 @ 15PPb or less (93.7%)

4179 @ 5PPb or less (84.9%)

308 OVER 15 PPb (6.3%)

37 OVER 150 ppb (0.75%)

26 COPPER OVER 1300PPb (0.5%)

KWA MEETING
FEB 1, 2016 1:30 PM

KWA READY MID 2016 JUNE/JULY
4 MILES OF PIPELINE MONTHLY
BOTH PUMP STION COMPLETE
INTAKE STATION COMPLETE
DIE-7 MARCH POWER

CONNECTION POINT TO SUPPLY
RAW WATER IS BEING USED
FOR DWSD WATER

NEED 2ND LINE TO STAND UP WTP

CITY ATTORNEY; FLINT RIVER
MUST BE ALLOWED AS AN
EMERGENCY BACK-UP

36" INCH LINE ONLY NEEDED TO TEST
ALL THREE TRAINS

3 1/2-4 MILLION

20" TEMPORARY LINE WOULD BE THEORETICALLY THE FASTEST TO CONSTRUCT

COUNTY

JOHN:

NEED SECONDARY OPTION

3 1/4 MILLION 20" TO FEED ONE TRAIN AT A TIME

FACILITIES

FEB - APRIL TESTING OF PILOT PLANT

MINES GCWTP

LAKE HURON DIFFICULTIES ARE IN SPRING & FALL AS THAT IS WHEN THE MOST CHANGE TAKES PLACE

FEB 3, 2016

TOTAL 5590

15 PPB OR LESS	5227	93.5%
5 PPB OR LESS	4737	84.7%
>150 PPB	47	0.84%
>15PPB	362	6.5%

JOEL BEAUVAIS (EPA)
KEITH CREACH (DEQ)
MARC EDWARDS (VTECH)
LIANE WALTERS (RESIDENT)

2/6/15

~~TOTAL~~ TOTAL
~~15PPB OR LESS~~

EAD
7744 TOTAL
7241 15PPB OR LESS (93.5%)
6548 5PPB OR LESS (84.6%)
62 >150 PPB (0.80%)



8:00 AM 2/8/14

DIARA PLUMBERS TO IDENTIFY FIXTURES & PLUMBERS TO REPLACE

- CONTACT DIARA RE FIXTURE REPLACEMENT
- SENTINEL SITE TRACKING IN DATABASE
- ** FOOD ESTABLISHMENT TESTING FOLLOW UP *
- HIGH COPPER RESULT FOLLOW UP *
  - GROUNDING & AERATORS, THEN RO
- FRIDAY MEETINGS WITH MARK DURNO *
- RE: REPORTS *
- SCHOOLS PROTOCOL

SCHOOLS SAMPLING PROTOCOL RELEASE *

BY WEDNESDAY

HOW MANY TEAMS
WHAT IS THE NEED
WHAT IS THE TIMEFRAME

EXPERT COMM. TEE CLARIFY WITH KEITH

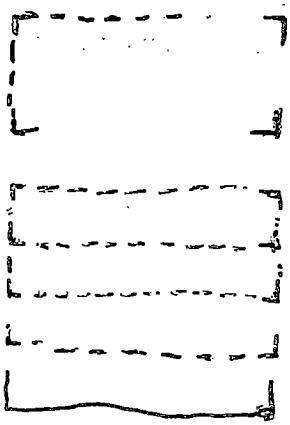
SENTINEL
- DEQ - RAINOG
- PLUMBER
- LOCAL

ID TEAM LEADERS IDENTIFIED FOR SCHOOLS TESTING BUT WE

X NUMBER OF TEAMS
Y NUMBER OF PEOPLE

* WE HAVE TO PUSH DIARA *

** SPOKE WITH KEVIN HARMON AT MDARD REGARDING FOOD FACILITIES FOLLOW-UP



~~MICHAEL REED~~

ADDITION LOCATION LIST

LEAD - FOLLOW - BP

SENTINEL - SITE

CALL
MIKE
GLASGOW

RE: REPORTS

NEED @ LIST FROM LARA

1) RESIDENTIAL (REPORTS TO BE SENT BY LABS)

2) SCHOOLS → NEED FOLLOW UP COORDINATION W DLARA

3) FOOD ESTABLISHMENTS (MDARD LIST ON FLINTWATER)

4) EBLS ..... DHHS HAS UNDER CONTROL

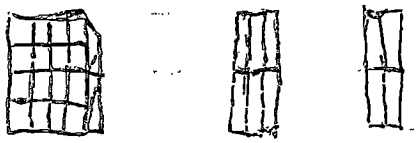
5) SENTINEL SITES
LOGISTICS BEING FINALIZED
OUTREACH TO BEGIN 2/10/16

LIZ, JIM, BRYCE, STEVE SLWER

E MAIL

DONE 7:00 PM 2/8/16

SHELLY, JOE & ALESHA

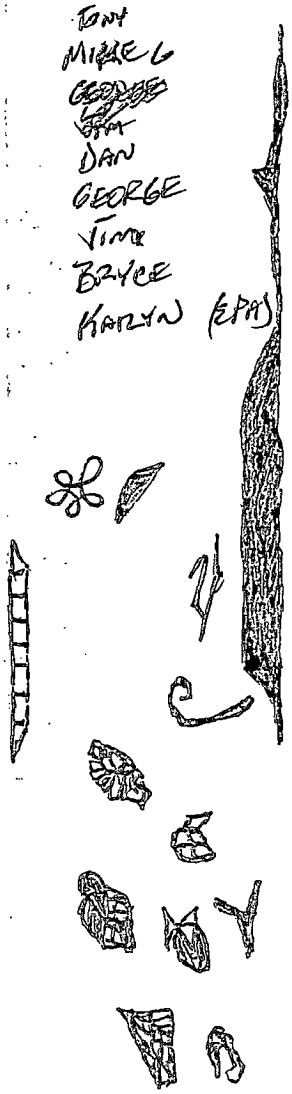


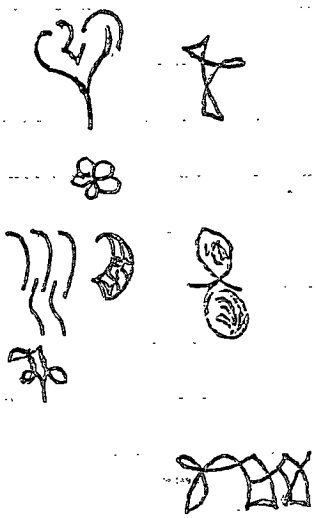
LOREN DENTON (EPA)
TOM SPITH (EPA)
TINKA HYDE (EPA)

TONY
MIKE L
~~GEORGE~~
~~TIM~~
DAN
GEORGE
TIM
BRYCE
KAITLYN (EPA)

USE PARAGRAPH # IN THE NAME OF THE DOCUMENTS

CHECK WITH DAVE





City of Flint Water
Action Steps for Week of November 9-13

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Conduct After Action Plan	DEQ	George Krisztian	Meeting held on 10/29/15 to discuss time line
2.	Introduce legislative changes to Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone George Krisztian Sonya Butler	Meeting scheduled among DEQ staff for 11/20/15 to discuss draft changes
3.	Assist Governor's Flint Water Task Force	DEQ	Madhu Anderson George Krisztian Karen Tommasulo	Draft time line shared with Task Force on 11/13/15
4.	Staff hiring plan	DEQ	Jim Sygo Maggie Pallone George Krisztian	Negotiations underway to contract with the Genesee County Health Department
5.	Finalize fiscal year 2017 budget request	DEQ	Maggie Pallone George Krisztian	
6.	Meeting(s) with school staff/management	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	
7.	Follow up with city of Flint regarding corrosion control treatment and their plans to address requirements and options provided for in 10/30/15 DEQ letter	DEQ and EPA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Discussed with Flint's Technical Advisory Committee on 11/9/15

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
8.	Follow-up with city of Flint regarding installation of corrosion control	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	Chemical feed pumps have been ordered; currently installing feed system piping and water booster pumps; and city of Flint anticipates operation by end of November
9.	Review Monthly Operation Reports (MORs) for Standby Operation of Flint Water Treatment Plant with city of Flint; draft letter to city of Flint documenting standby operation requirements	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Letter is drafted and will be sent to city of Flint the week of 11/9/15
10.	Work with Karegnondi Water Authority (KWA) and other agencies to address bottleneck issues; check weekly for status update	DEQ and KWA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Discussed during 11/9/15 Flint Technical Advisory Committee meeting; Genesee County is working on issues with Lapeer County Road Commission
11.	Continue evaluating city of Flint service line record status and comparison to sampling pool	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Letter provided to city of Flint on 11/9/15; response due to DEQ by 12/30/15
12.	Provide DHHS with any available cross-reference information regarding lead service lines and plumbing materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
13.	Develop draft sampling protocol for residential exposure assessment for DHHS	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	Draft sampling protocol shared with DHHS on 11/10/15

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
14.	Make progress on drafting a generic school sampling guidance document for statewide distribution; target audience: schools served by municipal water	DEQ and DLARA	Jim Sygo Steve Busch Richard Benzie	Draft document under development to make it an easy-to-read and follow guidance document
15.	Attend Flint Technical Advisory Committee meeting on 11/9/15	DEQ	Jim Sygo Mike Prysby	Attended by Jim Sygo and Mike Prysby; presented DEQ's findings of lead sampling at Freeman Elementary School
16.	Draft summary reports for Brownell K-2 STEM Academy and Eisenhower Elementary School	DEQ and DLARA	George Krisztian Steve Busch	
17.	Conduct plumbing assessments at Durant-Tuuri-Mott Elementary School and Central Kitchen	DEQ and DLARA	George Krisztian Steve Busch	DEQ and DLARA completed plumbing assessments on 11/13/15
18.	Conduct sampling at Durant-Tuuri-Mott Elementary School and Central Kitchen	DEQ and DLARA	Jim Sygo George Krisztian Mike Prysby	DEQ and DLARA completed sampling on 11/14/15
19.	Evaluate laboratory analysis and perform data compilation for Doyle/Ryder Elementary School and Pierce Elementary School	DEQ	George Krisztian Steve Busch Mike Prysby	

Flint Drinking Water Action Plan Update

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

- The initial After Action Plan meeting was held on October 22. Topics covered were:
  - The discussion of the roles of each team member
  - The scope of the After Action Plan
  - The time frame in which the After Action Plan is to be completed

  The main components of the After Action Plan are:
  - An After Action Review Summary time line that details critical events in chronological order, asking key questions, and providing explanations for actions taken
  - Implementation of the Governor's 10-point Action Plan
  - An evaluation of if DEQ made mistakes and, if so, what they were
  - An evaluation of lessons learned, defining what we can do better/differently in the future

- Participated on an October 22 conference call with the EPA's Flint Safe Drinking Water Task Force to discuss proposed sampling protocol and the comments received from EPA. Agreed to reconvene a call next week to discuss how the pilot sampling effort goes, what went well, what might need to be adjusted, etc.

- A summary of our discussion with EPA regarding Flint's corrosion control plan was provided to Darren Lytle and Michael Schock of EPA. The summary included confirmation of the actual phosphate dosage from the Detroit Lake Huron Water Treatment Plant.

- Proper dosages are now confirmed, based on incoming phosphate residual at Flint. A product cut-sheet to confirm NSF approval and maximum dose is to be provided shortly. Flint's consultant (Lockwood, Andrews & Newnam, Inc.) will also confirm proper sizing of the feed pumps. Anticipate receiving this information on October 23, which will facilitate issuance of the Act 399 permit.

- An updated monitoring schedule is completed and signed. The schedule will be mailed to the city of Flint on October 23. A copy of the updated monitoring schedule is attached.

- An e-mail was sent to John O'Brien of Genesee County informing him of our concern over improper soil erosion control measures at the pipeline job site and what corrective measures were being taken to avoid a potential halt of construction by the Lapeer County Road Commission. Genesee County has not responded thus far.

Additional Actions:

- A conference call was held among representatives from DEQ/DLARA/DHHS to further discuss ways to ensure that the efforts of all three agencies were coordinated. It was determined that weekly calls providing updates to the group as a whole would be beneficial. DEQ also agreed to copy DLARA and DHHS on their daily update report to the Governor's office.

- Flint Action Plan Coordinator George Krisztian contacted Flint Community Schools Superintendent Bilal Tawwab to obtain permission to allow the *Detroit Free Press* to take footage of the water sampling process to be conducted at Freeman Elementary School on Saturday, October 24. Superintendent Tawwab gave his permission, stating that it would not be an issue since there would not be any students present.

- DLARA completed additional review of documents at the Flint repository to assist with the sequencing at the schools.

- Flint is able to provide DLARA plumbing inspectors with on-site workspace; additional documentation gives greater guidance on locations for plumbing fixtures.

- DLARA received confirmation from DEQ that bottles and necessary equipment will be available for sampling start on Saturday, October 24.

Attachment (Updated Monitoring Schedule)

Prepared by: George Krisztian, Flint Action Plan Coordinator
Laboratory Director
Department of Environmental Quality
Telephone: 517-284-6719
Cell: PPI (new number)
October 23, 2015

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

October 22, 2015

Mr. Brent Wright
City Of Flint – D.P.W
Flint Water Plant
4500 North Dort Highway
Flint, Michigan 48505

WSSN: 02310

Dear Mr. Wright:

SUBJECT: Revised Drinking Water Monitoring Schedule – 2015
Monthly Operation Reports
Siting Plans and Record Keeping

Monitoring Schedule:

Enclosed is your revised Drinking Water Monitoring Schedule for remainder of calendar year 2015 outlining the minimum requirements for your public water supply. Your schedule has been revised based on the City's change in source of its drinking water from the treatment of the Flint River utilizing the City's Water Treatment Plant to the Great Lakes Water Authority/Detroit Water and Sewerage Department. Collect samples early in the monitoring period of the year indicated on the schedule. If you use a private laboratory you are required to report the results to us within the first ten days of the month following the month that you received the results. To receive credit for monitoring, the **"WSSN"** (water supply serial number), the **"Site Code,"** and **"County"** must appear on the sample result. Bottles will NOT be mailed automatically. If you use the Department of Environmental Quality Laboratory, you can order bottles by calling 517-335-8184. Be certain of the United States Environmental Protection Agency sampling and analysis method requirements for hold times.

Monthly Operation Report (MOR) Requirements:

The City shall submit MORs as required under Administrative Rule 1502 (R325.11502). Please note required coliform bacteria monitoring results and associated chlorine residual monitoring shall be submitted to the department within the first 10 days following the end of the required monthly monitoring period. In addition, monthly operation reports shall be submitted to the department during the month following the month for which the monthly operation report was prepared.

Disinfection By-Product Sample Siting Plans:

The City of Flint shall continue routine standard monitoring of disinfection by-products, according to your Disinfection & Disinfectants By-Product (DDBP) plan which identifies 8 sites for routine quarterly monitoring.

Lead and Copper Monitoring Requirements and Site Sample Pool

Please note distribution system monitoring for water quality parameters (WQPs) continues at the expanded set of 25 sites per quarter. Lead and copper monitoring in accordance with the requirements of Administrative Rule 710a (R325.10710a) is being required for the 6 month period between January 1, 2016 and June 30, 2016. The City must ensure its sample site pool is large enough to collect the number of lead and copper tap samples required. All sites from which first draw samples are collected shall be selected from the pool of targeted sampling sites.

The City shall also conduct additional operational monitoring to demonstrate the effectiveness of corrosion control treatment.

Record Keeping:

The City shall maintain all monitoring records in accordance with all applicable requirements under the Administrative Rules including Rule 720a (R325.10720a), Rule 1506 (R325.11506), and Rule 1507 (R325.11507).

The Michigan Safe Drinking Water Act requires certain reports to be submitted to this office each year. Please remember that cross connection reports and annual pumpage reports are due by March 31, and the **Consumer Confidence Report** is due by July 1.

Also enclosed is the document "2015 Monitoring and Reporting Requirements." This provides additional details about monitoring and reporting requirements. If you have any questions, please contact us using the information below.

Michael F. Prysby, P.E., District Engineer
Lansing District Office
Office of Drinking Water and
Municipal Assistance
517-290-8817

Adam Rosenthal, EQA
Lansing District Office
Office of Drinking Water and
Municipal Assistance
517-284-6644

Enclosure
cc/encl: Mr. Robert Bisnick, City Of Flint
Genesee County Health Department

2015 Monitoring Schedule

FLINT, CITY OF **WSSN: 02310**

Collect samples early in the monitoring period. This schedule reflects your expected routine monitoring and is subject to change. To receive credit for monitoring, include the **WSSN, Site Code, and County** on your request for analysis form. Collect Bacteriological and Automated Partial Chemistry samples close to the shipping time and send overnight delivery. Send all sample results to your Department of Environmental Quality (DEQ) district office unless you use the DEQ laboratory. Test codes, sample units, and costs are listed to help you complete the DEQ laboratory form. Prices are subject to change without notice. The DEQ laboratory is closed on state holidays.

Location: Distribution System

Sample Type	Collect Samples According to the ...	# Samples/ Frequency	Collect	Site Code	Fee	Unit Number	Test Code
Bacteriological – coliforms	TCR Sampling Site Plan	100/Monthly	**Monthly**	DIST	$16.00	30	BPTC
Chlorine Residual	DBP Monitoring Plan	If serving chlorinated water, measure the residual disinfectant level at the same point and at the same time as the bacteriological sample and report the average to the DEQ.					
Total Trihalomethanes	DBP Monitoring Plan	8/3 months	**During February, May, August and November 2015**	See DBP Monitoring Plan	$65.00	36VO	CXTM
Haloacetic Acids		8/3 months	**During February, May, August and November 2015**	See DBP Monitoring Plan	$130.00	36HA	CXHA
Water Quality Parameters	Representative Sites	25/Quarterly	**Quarterly**	DIST	Various	Various	Various
Lead Copper for Corrosion Control	Lead and Copper Sampling Pool	60/6 months	Between 1/1 and 6/30/2016	DIST	$26.00	36CC	CCUB

Community Water Supply
2015 Monitoring and Reporting Requirements

Please Monitor Early: Collect samples early in the monitoring period (month, quarter, year) of the year indicated on the schedule. Bacteriological and partial chemistry samples should be collected close to the shipping time and sent overnight delivery to assure sample holding times are not exceeded (30 and 48 hour hold times respectively). We also recommend avoiding mailing bacteriological samples immediately preceding or following a holiday because samples tend to exceed the 30 hour hold time. When this occurs, a repeat sample must be collected as soon as possible upon notification.

If you use a private laboratory please report the results to us within the first ten days of the month following the month that you received the results. A list of certified laboratories is available on request. If samples are not collected as indicated on your monitoring schedule, you will incur a monitoring violation and possibly a fine. For information on the fines policy, visit http://michigan.gov/deqwater. Click on Drinking Water, Community Water Supply, and Administrative Fines (under Laws and Rules).

To receive credit for monitoring, you must include the **"WSSN"** (water supply serial number), the **"Site Code,"** and the **"County"** when you submit samples for analysis. Site codes are listed on your monitoring schedule.

Special Instructions If You Use The DEQ Laboratory: Bottles will NOT be mailed automatically. To order bottles, call the DEQ Laboratory at 517-335-8184 or download the form EQP 2301 *Requisition for Water Sample Units* from www.michigan.gov/deq. Click on Key Topics, Laboratory Services, Drinking Water, Obtaining The Necessary Sampling Units, and 'test list'. Please note that the DEQ laboratory is closed on most state holidays. The DEQ laboratory prices are subject to change without notice.

Special Instructions For Automated Partial Chemistry, VOC and TTHM Samples: These sample bottles must be cooled and preserved during shipment to the laboratory. If you use the DEQ laboratory, you will receive the ice pack, acid dropper (if necessary) and small cooler when you request the bottles. Samples must be preserved correctly to be used for compliance purposes. To avoid resampling follow instructions contained with the sample bottle. If you would like more information, contact the DEQ lab, at 517-335-8184, or contact this office.

Cyanide: Previously, supplies that chlorinated the water were waived from monitoring for cyanide. The U.S. EPA now requires all supplies to sample the entry point for cyanide.

UCMR3 Monitoring: You may have monitoring requirements in 2015 under the third Unregulated Contaminant Monitoring Rule (UCMR3). The U.S. EPA will contact you directly if your water supply is required to monitor in 2015. A list of laboratories certified to analyze the samples collected for UCMR3 is available at http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/ucmr3/upload/lablist.pdf. Contact the U.S. EPA with questions.

Reminder if Lead and Copper Monitoring Due This Year: Provide individual lead tap results to people who receive water from sites that you sampled, even if lead was not detected, within 30 days of learning the results. Send us a certification that you met all the delivery requirements along with a sample copy of the customer notice within 3 months after the end of the monitoring period. Water supplies that failed to distribute the Consumer Notice of Lead Results must include the following statement in their CCR, "During the year, we failed to provide lead results to persons served at the sites that were tested as required by the Lead and Copper Rule." To download the *Lead and Copper Report and Consumer Notice of Lead Result Certificate* in Microsoft Word or PDF format, visit www.michigan.gov/deqwater. Click on Drinking Water, Community Water Supply, and Reporting Forms (under Manuals, Forms & Brochures).

Annual Reports: These reports are due to this office each year.

- The **Cross Connection Report**, due by March 31, describes the status of your local cross connection control program. Manufactured housing communities are exempt from this requirements until 2016.

  Each year, water supplies must submit this report, even if a formal program has not been implemented. If cross connections do not exist in your water system, indicate so on the report. Download the Cross Connection Report form from http://michigan.gov/deqwater. Click on Drinking Water, Community Water Supply, Reporting Forms (under Manuals, Forms & Brochures). Instructions are included with the form.

- The **Annual Pumpage/Usage Report**, due by March 31, is required of water supplies that do not submit monthly operation reports.

  This summary of water pumpage and water use must be submitted by each water supply that does not submit a monthly operation report. To manage our natural resources, pumpage data are compiled to determine water use demands in Michigan. Download the Annual Pumpage/Usage Report form from http://michigan.gov/deqwater. Click on Drinking Water, Community Water Supply, Reporting Forms (under Manuals, Forms & Brochures). Please be sure to indicate the appropriate units on the report (e.g. million gallons or gallons).

- The **Consumer Confidence Report**, due by July 1 to your customers, to your local health department and to this office, describes the quality of the water and characterizes the risks, if any, from exposure to contaminants detected..

  Electronic delivery methods may be used to distribute the CCR to bill-paying customers, provided the method is direct. A paper copy must be delivered to bill-paying customers who request it or known to be unable to receive the CCR electronically. For more information on e-delivery, visit www.michigan.gov/deqwater. Click on Drinking Water, Community Water Supply, Consumer Confidence Report Rule (under Laws and Rules).

(DRAFT)
FLINT WATER ADVISORY TASK FORCE
AFTER-ACTION REVIEW

The Flint Water Task Force is an independent advisory panel appointed by Governor Rick Snyder charged with reviewing actions regarding water use and testing in Flint and with offering recommendations for future guidelines to protect the health and safety of all state residents.

The task force expects to summarize its work in a report to be presented to Governor Rick Snyder within ninety (90) days.

GOALS

The Flint Water Task Force's goals are as follows:

- Complete a thorough review of all steps taken by state and local officials regarding the decision to switch the City of Flint's water source to the Flint River from the Detroit Water and Sewerage Department's system (DWSD).
  - Produce a timeline of actions
  - Establish why each action was taken

- Review the roles of the federal, state, and local officials in the decision-making process
  - Identify best practices for federal, state, and local officials to work together in future similar situations
  - Evaluate where coordination between these entities could have been better, and how it could be improved

- Review federal, state, and local actions and protocols
  - Determine whether the proper procedures were followed
  - Identify which procedures should be changed

- Monitor and review the process, procedures, and protocols being followed as the City of Flint returns to the DWSD system
  - Ensure that proper corrosion controls and testing are in place
  - Highlight the appropriate actions that the City of Flint should follow when the future switch is made to the Karegnondi Water Authority's system

- Assess future practices
  - Highlight practices that should change for communities in similar situations
  - Recommend changes in law, procedure, or practice to ensure all Michiganders are drinking safe water

City of Flint Water
Action Steps for Week of October 26-30

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Conduct After Action Plan	DEQ	George Krisztian	~~Initial meeting held 10/22/15~~
2.	Introduce legislative changes to Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone George Krisztian Sonya Butler	Draft language submitted to Maggie Pallone for review
3.	After Action Review Panel	DEQ	Madhu Anderson George Krisztian Karen Tommasulo	Panel created and press release issued on 10/21/15
4.	Staff hiring plan	DEQ	Jim Sygo Maggie Pallone George Krisztian	
5.	Finalize fiscal year 2017 budget request	DEQ	Maggie Pallone George Krisztian	
6.	Meeting(s) with school staff/management	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	~~A meeting with the 10 remaining schools is tentatively scheduled for the week of 10/26/15.~~
7.	Meet with DHHS and discuss all lead education material for schools	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	Meeting held on 10/27/15; action items created
8.	Review corrosion control treatment plan and get any EPA comments	DEQ and EPA	Jim Sygo Steve Busch Pat Cook Mike Prysby	~~Summary of Flint's corrosion control plan submitted to EPA~~

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
9.	Review construction permit application and issue construction permit for phosphate equipment	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	Additional items provided; still need 2 more items
10.	Review Standby Operation of Flint Water Treatment Plant with city of Flint	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Comments by DEQ to city of Flint have been provided
11.	Work with Karegnondi Water Authority (KWA) and other agencies to address bottleneck issues; check weekly for status update	DEQ and KWA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Issues regarding soil erosion controls during construction are being addressed
12.	Contact city of Flint for Service Line Record status update and obtain a copy of the records to date	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Cross-referencing process has begun
13.	Provide DHHS with any available cross-reference information	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
14.	Develop childcare facility guidance or review DHHS-related materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	Meeting held on 10/27/15; DHHS to provide materials
15.	Create a generic school sampling guidance document for statewide distribution; target audience: schools served by municipal water	DEQ and DLARA	Jim Sygo Steve Busch Richard Benzie	FINAL DRAFT OF SCHOOL SAMPLING PROTOCOL HAS BEEN UNDER 4 & 5 DAYING FINAL REVIEW

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
16.	Confirm plumbing assessment and sampling is scheduled for Brownell K-2 STEM Academy and Eisenhower Elementary School	DEQ and DLARA	Jim Sygo Steve Busch Mike Prysby	Tentatively scheduled for 10/30/15

6Jan16

Department of Environmental Quality
Drinking Water Program Budget Request
December 22, 2015

Appropriation	FTEs		Amount
One-Time (2016 Supplemental)			
City of Flint Emergency Water Services		$	3,900,000
• Support half of the cost for Flint to stay on the Great Lakes Water Authority water system for six additional months (July 1, 2016 - December 31, 2016) until the Karegnondi Water Authority pipeline is completed.			
• This request assumes the other 50% of the costs to stay on the existing system will be supported by funding from local partners.			
• There may be additional costs for Flint to connect to the Karegnondi Water Authority water system. This request assumes those costs will be a local cost and not funded by the state.			
Total One-Time Funding		$	3,900,000
Ongoing			
Drinking Water and Environmental Health Staff			
Corrosion Control Specialists	3	$	450,000
Sampling Staff	2	$	300,000
Lab Staff	3	$	450,000
Service Line Verification Staff	2	$	300,000
Total Staff	10	$	1,500,000
Local Health Department Contracts and Testing Fees		$	1,000,000
Lab Equipment		$	300,000
Travel		$	100,000
Other Supplies and Services		$	100,000
Total Ongoing Funding		$	3,000,000
Total Funding Request		**$**	**6,900,000**

Flint Drinking Water Action Plan Update

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

Key Actions:

- The city of Flint has received the necessary building permits to move forward with plans for the supplemental addition of phosphate to water that is coming from the Detroit Water and Sewerage Department. The purpose of the supplemental addition of phosphate is to reestablish the protective coating throughout the distribution system. This protective coating slows the leaching process of lead from service lines, household fixtures, and solder used for connecting copper pipes. The city of Flint has made the purchase of the necessary equipment a high priority and hopes to have the pumps installed and running within the next month.

- The report for Freeman Elementary School that documents and explains the results of the plumbing evaluation conducted by the DEQ and DLARA has been completed and will be distributed on November 9. The report demonstrates that the issues in the school are fixture-specific and that there was no evidence found to suggest that significant lead contamination is occurring deep within the plumbing system. The report will recommend replacement of fixtures that were found to have lead levels exceeding 15 parts per billion. Once a press release has been issued, the report will be posted to the Flint water Web site: www.mi.gov/flintwater.

- Data for residents of the city of Flint have been compiled into spreadsheets that sort the data by ZIP Code and also by concentration. The data to date indicate that the issue of lead contamination is not system-wide but is site specific. Over three quarters of the samples showed lead levels of 5 parts per billion or less and over 91 percent of the samples were at levels of 15 parts per billion or less. These spreadsheets will also be posted to the Flint water Web site.

Positions:

- With respect to the school data and the samples submitted by residents through the free lead testing program, the issue of lead contamination in the water appears to be site specific. In both cases, the water within the distribution system does not appear to be the issue. The contamination appears to be coming from fixtures, solder used to connect copper, and from lead service lines. While the initial results are encouraging and show that the large majority of homes do not have an issue, it is important that residents do not make assumptions. The only way to know if water contains lead is to have it tested.

Concerns:

- The action level of 15 parts per billion that is used in the lead and copper rule (LCR) was set up to determine if a supply was utilizing optimized corrosion controls. It was not meant to serve as a health-based exposure model. The

DEQ will be releasing data on Freeman Elementary School and residential data on November 9. The DHHS is currently working on evaluating blood lead levels on children in the city of Flint. It is important that when the DHHS is ready to present their data that the message they present does not inadvertently contradict information provided by the DEQ. While it is recognized that the ultimate goal is to have no detectable amount of lead in the water, this goal may not be practical as the DEQ utilizes the criteria as specified by the U.S. Environmental Protection Agency (EPA).

* The State of Michigan is being criticized as a result of recent information coming to light that a significant number of samples were not collected from proper sampling locations as part of the sampling program in the city of Flint to demonstrate compliance with the LCR under Michigan's Safe Drinking Water Act, 1976 PA 399, as amended (Act 399). Recently the city of Flint began to electronically convert customer service line information. This effort, along with statements by some of the city of Flint's certified operators, directly conflicts with information certified by the city of Flint in documents referred to as LCR compliance monitoring certification reports.

* Correspondence is drafted and will be sent to the city of Flint requesting that they provide appropriate documentation to demonstrate that the sampling locations selected and certified by the city of Flint comply with Act 399. In the absence of appropriate justification/documentation, the city of Flint may be subject to enforcement for violation of Act 399.

Significant Event:

* On November 3 the EPA issued a memorandum to address "certain concerns raised about the application of the [federal] 1991 Lead and Copper Rule, specifically the requirements pertaining to maintenance of optimal corrosion control treatment, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source." This EPA memorandum further states: "This type of situation rarely arises and the language of the LCR does not specifically discuss such circumstances. After reviewing the rule with our Office of General Counsel, it appears that there are differing possible interpretations of the LCR with respect to how the rule's optimal corrosion control treatment procedures apply to this situation...." This EPA memorandum clarifies the requirements should a situation like Flint occur again in the future. However, it clearly recognizes that the options chosen by Michigan were one interpretation or option of the LCR.

Changes from Previous Report:

* Staff e-mailed Michael Glasgow and Brent Wright of the city of Flint on November 4 to request a time line and a request to notify the DEQ when the phosphate equipment is installed. Mr. Wright responded on November 5 noting

that the city of Flint just received the Act 399 permit in the mail on November 5. Equipment is to be ordered by November 6, and the Flint Water Treatment Plant operators plan to start installing the feed piping on November 9.

- A letter detailing standby operation requirements is currently being prepared by the DEQ and will be sent to the city of Flint during the week of November 9. A review of the standby operation monthly operation reports with the city of Flint will be conducted during the next routine site visit at the Flint Water Treatment Plant.

- A letter has been prepared that requests the city of Flint to provide additional information and documentation regarding all of their historic LCR compliance sampling sites and to compare the service line information reported on the LCR compliance monitoring certification reports against the service line information from the city of Flint's digitized index cards. Conflicts noted between the index cards and the LCR compliance monitoring certification will need further explanation, and the city of Flint will need to provide supporting documentation demonstrating these sites meet Tier 1 criteria. The letter will be provided to the city of Flint on November 9.

- The draft document for sampling protocol for residential exposure assessment is under development. DEQ staff discussed the preliminary plan with DHHS staff.

- The draft document for generic school sampling guidance for statewide distribution is under development. Staff is working on making this an easy-to-read and follow guidance document.

- DEQ staff met with DHHS staff on November 5 to discuss residential elevated blood lead investigations and a protocol for water testing.

Other Items:

- As provided by the DHHS, the purchased total water filter/pitcher distribution through November 6 is 13,649 units.

- Attached are the:
  - Final report for the plumbing evaluation of Freeman Elementary School
  - Spreadsheets that consolidate the lead and copper data for Freeman Elementary School
  - Consolidated spreadsheets for water samples submitted by Flint residents sorted by ZIP Code and sorted by concentration

Prepared by: George Krisztian, Flint Action Plan Coordinator
Laboratory Director
Department of Environmental Quality
Telephone: 517-284-6719
Cell: PPI
November 9, 2015

Flint families deserve clean, safe water – now and into the future. To eliminate issues with lead in the city's drinking water, Gov. Rick Snyder announced a comprehensive action plan Oct. 2, addressing residents' short-, intermediate- and long-term needs.

The plan includes:

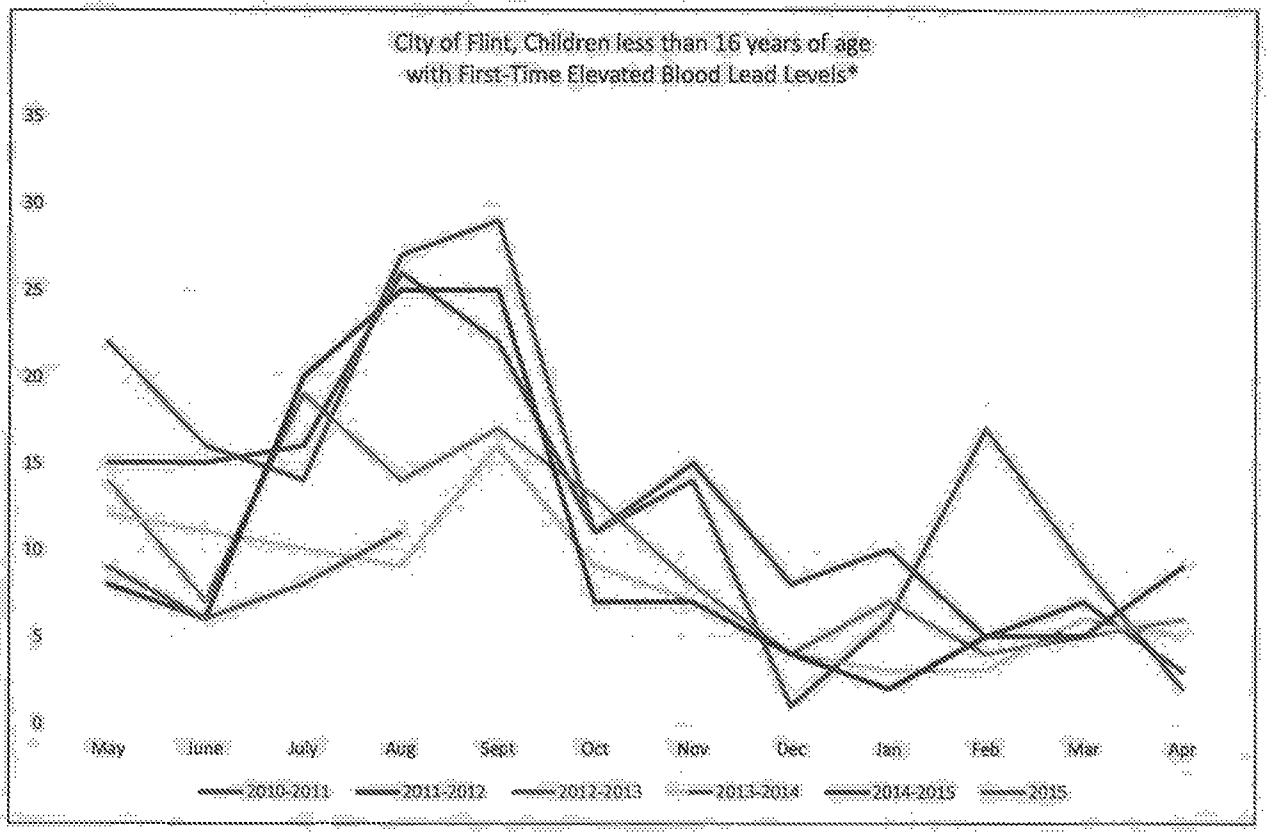
- Testing in Flint public schools immediately to ensure that drinking water is safe, with testing also available at no cost to any other school in Flint.
- Offering free water testing to Flint residents to assure their drinking water is safe.
- Providing free water filters to residents.
- Expanding health exposure testing of individual homes.
- Accelerating corrosion controls in the Flint drinking water system.
- Accelerating water system improvements to address replacing lead service lines.
- Expediting the completion of the Karegnondi Water Authority pipeline.
- Expanding a Safe Drinking Water Technical Advisory Committee to ensure the best technology, practices and science are being followed by adding an expert from the Environmental Protection Agency's Office of Research and Development to the group.
- Naming Dr. Eden Wells, chief medical executive for the Michigan Department of Health and Human Services, as the Flint drinking water public health adviser.
- Boosting a comprehensive lead education program to make sure residents have detailed information about how to protect themselves and their homes.

The state now is working to implement all 10 action steps. For results from Flint Community Schools testing, free homeowner water testing and free blood lead level testing, as well as information about how to get a free water filter and a free home water test, see the resources below.



Blood Lead Testing of Children in Flint, Before and After the Change in Flint's Water

- The change in Flint's water source occurred in April 2014. MDHHS looked at children's blood lead levels (BLL) before and after this event.
- The dark blue line (May 2014 – April 2015) and the green line (May-August 2015) reflect children's blood lead tests after the change. All other lines reflect tests before the change.
- An increase in childhood lead poisoning in summer (July, August, September) is typical throughout Michigan every year.
- While there is a dramatic difference between the numbers of elevated BLL in the summer before and after the event, a wider look that includes data back to 2010 shows that the year BEFORE the event (the yellow line) was more of an anomaly than the year after (the dark blue line).
- If elevated BLL were being driven by the change in water, we would expect the dark blue line to stay high rather than follow the seasonal pattern.
- All data included in this analysis were reported by laboratories directly to MDHHS, in accordance with State law.



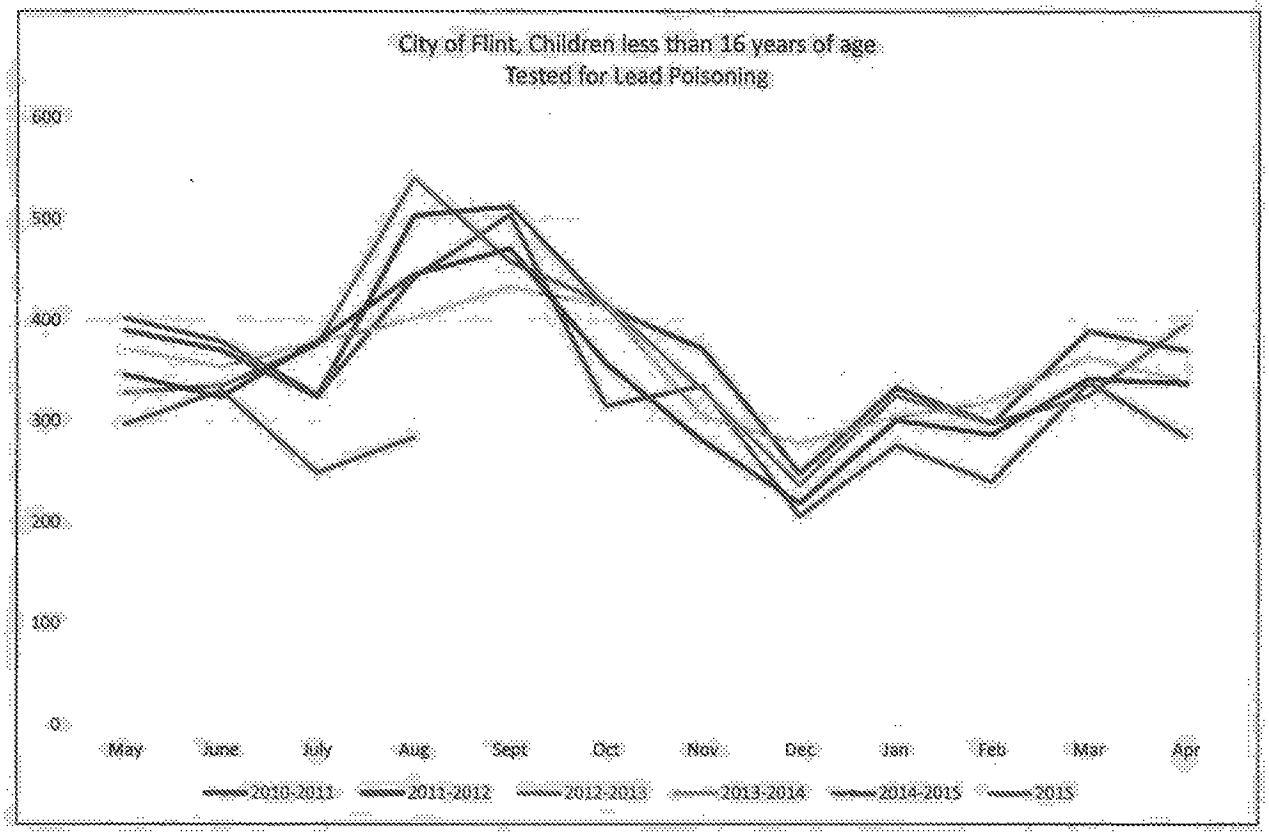
*This graph includes:
Children whose address is listed as "Flint"--may not conform exactly to Flint city limits
Children less than 16 years of age at time of test
Only first-time blood lead levels >= 5 ug/dL
All first-time elevated levels, regardless of sample type (venous, capillary or unknown)

September 24, 2015

Source: MDHHS Data Warehouse, Lead Specimen table

Blood Lead Testing of Children in Flint, Before and After the Change in Flint's Water

- Blood lead testing (regardless of elevated levels) also tends to rise during late summer (August, September, October).
- This graph shows that testing in Flint has remained fairly steady over the last five years, except for a recent decline(May – August 2015).



*This graph includes:

Children whose address is listed as "Flint"--may not conform exactly to Flint city limits

Children less than 16 years of age at time of test

The number of children tested within each month.

Some children are tested more than once, and may be included in more than one month or year.

September 24, 2015

Source: MDHHS Data Warehouse, Lead Specimen table

Michigan Department of Environmental Quality
News Release

Nov. 9, 2015

For More Information:
Staff Contact, 000-000-0000, email@michigan.gov

Freeman Elementary, homeowner testing data indicate lead exposure in Flint is localized, not systemic

As part of Gov. Rick Snyder's action plan for Flint drinking water, the DEQ today released water testing data from more than # homes and businesses in Flint as well as comprehensive sampling results from Freeman Elementary School.

Both sets of data indicate the problems with lead are localized to individual buildings or even individual faucets, rather than system-wide issues.

"The results from this data underline the need for water testing at all homes, businesses, schools and other buildings in Flint," DEQ said. "Problems with lead exposure appear to be localized to individual service lines or plumbing fixtures, and we want to see all families in Flint take advantage of free water testing from the state."

Freeman Elementary testing results
At Freeman Elementary, 31 faucets were tested four times each, and only nine faucets came back with at least one sample that showed lead water level results greater than 15 parts per billion. Those nine outlets involve brass components, suggesting the problem involves local plumbing materials. The other 22 faucets did not have any samples that showed elevated lead levels.

Additional testing designed to look deep into the school's plumbing did not suggest larger, systemic problems.

Freeman Elementary has several options for remedying the problems at these nine faucets and fountains. They can elect not to use those particular fountains, or they can implement a flushing regimen. The sampling results indicate that for all but one tap, a 3- to 4-minute flushing period each morning would drastically reduce lead exposure. For a permanent solution, the school could opt to replace the faucets and fountains of concern.

Quote from Superintendent

For Freeman Elementary's complete sampling results and more information about how sampling was conducted, visit www.michigan.gov/flintwater.

GK-

Krisztian, George (DEQ)

From: Crooks, Jennifer <crooks.jennifer@epa.gov>
Sent: Tuesday, July 28, 2015 9:47 AM
To: Shekter Smith, Liane (DEQ); Benzie, Richard (DEQ); Philip, Kris (DEQ); Monosmith, Carrie (DEQ); DeBruyn, Dana (DEQ); Dettweiler, Dan (DEQ); Busch, Stephen (DEQ); Prysby, Mike (DEQ); Cook, Pat (DEQ); Holdwick, Kevin (DEQ)
Cc: Poy, Thomas; Bair, Rita; Damato, Nicholas; Shoven, Heather; Kuefler, Janet; Murphy, Thomas; Porter, Andrea; Deltoral, Miguel
Subject: Final Notes from Michigan semi-annual call on 6/10

I was supposed to finalize these in mid-July, but I didn't receive any changes from anyone, so these notes are final now. Thank you all again for participating. FINALIZED JULY 21, 2015 NOTES MARKED DRAFT
Jennifer

From: Crooks, Jennifer
Sent: Wednesday, July 01, 2015 5:31 PM
To: Shekter Smith, Liane (DNRE); Richard Benzie; kris philip; Monosmith, Carrie (DNRE); DeBruyn, Dana (DEQ); Dettweiler, Dan (DEQ); Busch, Stephen (DEQ); 'Prysby, Mike (DEQ)'; 'cookp@michigan.gov'; Holdwick, Kevin (DEQ)
Cc: Thomas Poy; Bair, Rita; Damato, Nicholas; Shoven, Heather; Kuefler, Janet; Murphy, Thomas; Porter, Andrea; Deltoral, Miguel
Subject: Draft Notes from Michigan semi-annual call on 6/10

All—Below are my draft notes from our call last week, June 10, 2015. Thank you all for participating. I apologize for the delay in getting these out in draft to you all for review—I was hoping to get a couple of items ironed out that were fuzzy during our discussions, but hasn't happened yet. Several ACTION items below. So, please review to make sure I documented our discussion/agreements correctly, and feel free to edit as needed. I you could get back to me by July 13, that would be great. Thank you!

Jennifer

Attendees:
MDEQ: Liane Shekter-Smith, Richard Benzie, Carrie Monosmith, Kris Philip, Dan Dettweiler, Marjorie Rodriguez (Student), Kevin Holdwick, Mike Prysby, Dana DeBruyn, Steve Busch
EPA Region 5: Tom Poy, Rita Bair, Nick Damato, Janet Kuefler, Michele Palmer, Tom Murphy, Heather Shoven, Cary McElhinney, Andrea Porter, Miguel Deltoral, Mostafa Noureldin

Summary:

1.Changes in Lead Disinvestments and Commitments for FY 2016 ARDP—for discussion: Due to our extreme focus on lead in drinking water, this is the consensus here.

a. Consumer notification of tap results at NTNCWSs:

(Suggested wording) The NCWS program commits to full implementation of the lead consumer notification of tap results requirement, to begin in CY 2016. Region 5 will assist in a notification outreach effort in late FY 2015 to remaining 698 NTNCWSs that are not schools/daycares, to begin providing lead consumer notice in CY 2016. NCWS program commits

to include information on providing lead consumer notice in the annual monitoring letter sent to all NTNCWSs for CY 2016.

STATE: The State found this change in the wording acceptable.

b. Collection of Lead samples at NTNCWSs during June – September 2016 timeframe

(Suggested wording) NCWS program commits to including information in the applicable NTNCWS annual monitoring letters of the requirement to collect their annual/triennial lead sample between June and September only, during CY 2016. The MDEQ NCWS program currently does not have the capability to easily track lead sampling compliance within this specific timeframe.

STATE: The State found this change in the wording acceptable.

c. Follow-up Actions for NTNCWSs that sample outside of June-September 2015 timeframe

(From 5/5/15 call notes w/EPA) MDEQ commits to providing Region 5 with all CY 2015 lead (and copper?) sample data for all NTNCWSs by March 2016 so that EPA can analyze how many PWSs monitored outside the June through October timeframe. EPA commits to follow-up with MDEQ to discuss follow-up actions.

STATE: The State agreed to providing EPA R5 the raw lead and copper data for all CY 2015 for all NTNCWSs. The WaterTrack database does have data, but it can't generate violations. MDEQ doesn't commit to enforcing against 2016 violators in FY 2016. The State said, it is planning on disinvesting in enforcing against these violators due to limited capability of WaterTrack; however, if the State's non-community data management capabilities improve during FY 2016, implementation of this disinvestment may become a reality. The State has not designated an alternate timeframe, or done system specific documentation as to why the system qualifies for a different timeframe.

OFFICIAL TERM THAT

IS THIS A LEGAL RESPONSIBILITY OR IS THIS FW ISSUE? NO

d. Submittal of the lead and copper reporting form

(Suggested wording) MDEQ commits to requiring CWSs and NTNCWSs to submit the lead and copper reporting form via the annual monitoring letters to each system, tracking CWSs and NTNCWSs submittal of the lead and copper reporting form, and commits to issuing violations for failure to submit the lead and copper reporting form. The reporting form provides the address of the sample site, designates sampling site selection criteria, and explanation(s) for any changes in sampling sites.

STATE: Dan Dettweiler stated that the NCWS program was not in a position to do this for the NTNCWSs at this time. Tom Murphy asked how does WaterTrack handle/track high lead results? Tom M said there is a truncation issue on the sample location name field. Dan acknowledged that this problem has been identified, and the Department of Technology Management and Budget (DTMB) has been trying to fix this problem, but it is a challenging problem. Dan stated that sample sites for NTNCWSs are actually identified by LHDs during the sanitary survey and are documented in the sanitary survey. The LHDs check the pdf of the laboratory results that clearly states where the sample was taken, and calculates the 90th percentile. However, Dan stated that the requirement to send in the lead and copper reporting form is not currently in the LHD annual monitoring letter sent to each system. The NTNCWSs do not couple this form to the Lead Consumer Notice, as does the CWSs. Kris Philip pointed out that the LHDs select the sample sites, thus when they are calculating the 90th percentile, they are actually double checking the sites with the results.

From our discussion, the Region concluded that at this time, the LHDs are actively reviewing the lead and copper results and the sample locations when they calculate the 90th percentiles to ensure proper LCR monitoring is conducted by ALL NTNCWSs at the proper sample sites. After our call, I asked for verification of this statement, and Dan Dettweiler

responded, "Just as with an exceeding value of an MCL, WaterTrack alerts the LHD when at least one sample for a water system exceeds the AL. A 90th percentile calculation is made only when an exceeding result alerts the LHD. For cases where there are no exceeding results, private lab samples are reviewed at the time LHDs hand-enter them into WaterTrack. State lab samples, which flow electronically via nightly downloads from the state lab database, are reviewed when pdfs of the analysis reports are, routinely, emailed by the state lab to LHDs. Beyond that, MDEQ's annual evaluation of the LHDs provides another opportunity for us to oversee the proper assigning and use of designated sampling locations."

ACTION: The Region will discuss Dan's response internally, and get back to the State with any issues/concerns.

Kris Philip said that the CWS program is requiring that the systems submit the form, but they are not enforcing whether or not the system submits the form. Often, the CWS will submit the Lead Consumer Notice and the Lead and Copper reporting form together. Kris said if 90%+ are already submitting the forms, then the State will agree to follow-up and enforce this requirement. But, if less than that, will probably be too much of a burden. Kris said they may change the way DEQ is tracking in SDWIS during FY 2016. But, the Region said SDWIS-Prime probably won't be available until 2017 at the earliest.

ACTION: Kris Philip will research with the District Offices to determine the current submittal rate of the lead and copper reporting form from CWSs; and report back to the Region.

2. Enforcement Update with Heather

NTNCWSs under Bottled Water agreements due to Arsenic MCL violations:
Per discussions with Region 5 and the February 2014 EPA/OECA memo, MDEQ has closed the old Arsenic open-ended MCL violations; however, no further quarterly monitoring is being conducted at the (±27) systems that are still under bottled water agreements. Thus, no more arsenic MCL violations will be reported for these systems and these systems will not become priority systems (ETT score of 11 or more) since only one arsenic MCL violation will be reported (5 points) even though they have a longstanding issue with arsenic noncompliance. The Region would like to discuss the pros and cons of placing these PWSs with arsenic MCL violations on quarterly monitoring as required under 40 CFR Section 141.23(c)(7); and brainstorm possible solutions.

Heather provided an update on how the State is doing in returning ETT systems to compliance; the State is doing very well in achieving its commitment for FY 2015. Heather said the Region is glad to see the State and LHD prioritization of implementation of the drinking water program and NTNCWS schools and daycares.
Referring to the NTNCWSs under BW agreements that are in violation of the Arsenic MCL, Heather said that since there are no more open-ended MCL violations in SDWIS, that no MCL violations can be reported to SDWIS unless there is monitoring to show the system is in non-compliance. Even though the LHD has indicated that these systems are drinking bottled water for public health protection, the use of bottled water cannot be a permanent solution to the fact that the system's drinking water at the tap continues to exceed the MCL for arsenic. Dan said there are 22 systems, where 8 are schools, that should be conducting quarterly monitoring. Dana said that letters have been sent (OR drafted?) to these 22 systems to require quarterly sampling for arsenic; these 22 systems are in 10 different counties so the message from the State is consistent. A secondary effect of this new requirement for the systems, may be that they transition to another water source or install treatment sooner.

The State voiced a concern that multiple quarterly violations could potentially affect the State's relationship with the LHDs financially. Genesee and Oakland Counties have quite a number of noncommunity water systems. Multiple quarterly violations could affect the Dept of Community Health's determination as to whether the LHDs are meeting their minimum program requirements; thus receive full funding for their work with the noncommunity systems for the drinking water program. The LHDs cannot have more than 20% of their systems with violations. The Region wonders how much funding would be cut from a LHD contract if it exceeds the 20% noncompliance level set in the contract?

NEED CONTEXT

3. Status of Flint

a. TTHM levels for May—Due to MDEQ district engineer June 10-RECEIVED; see link to results

https://www.cityofflint.com/2015/06/01/may-water-testing-results-show-all-locations-are-within-acceptable-limits-for-tthm/
All samples below the TTHM MCL; one site still has an LRAA above the MCL but decreased from 105 ppb in Feb to 93.5 ppb in May.

Mike Prysby said he is getting ready to issue the construction permit to the City of Flint to install a GAC filter in July, that will remove more TOC to further reduce the potential of developing TTHMs. Mike said he has already issued a construction permit for a transmission line within the City that will help reduce water age.

b. Lead in Flint DRAFT THEN FINALIZED NOTES OF EPA MEETING HELD ON 6/16/15

Our discussions with MDEQ indicate that no phosphates/corrosion control has been added to the system since April 2014 when the source of drinking water changed to the Flint River. We understand that the City is just finishing up its second set of 6-month initial monitoring for lead; where the results will probably warrant a Corrosion Control Study to be conducted. Since Flint has lead service lines, we understand some citizen-requested lead sampling is exceeding the Action Level, and the source of drinking water will be changing again in 2016, so to start a Corrosion Control Study now doesn't make sense. The idea to ask Flint to simply add phosphate may be premature; there are many other issues and factors that must be taken into account which would require a comprehensive look at the water quality and the system before any treatment recommendations can/should be made. Miguel is recommending MDEQ and EPA? approach Flint about formally requesting EPA's Office of Research and Development in Cincinnati support on the lead in Flint drinking water issue, and request that Mike Schock, ORD, and possibly Darren Lytle, ORD, to participate in Flint's drinking water advisory committee so that a comprehensive evaluation on how to proceed can be discussed.

Miguel provided a brief summary of the high lead results found at the residence of Ms. Leeanne Walters in Flint. Miguel will follow up with a written summary of the work conducted, sample results, and conclusions.
Miguel believes that lead levels in Flint are being affected by the lack of Corrosion Control being conducted by the City, since the LCR requires 2 6-month initial monitoring for a new source. Steve Busch stated that in the Lead sampling pool, almost all of the lead sample sites are lead service lines, and the State is not seeing large increases in lead levels at the tap. Miguel suggested that EPA experts in Lead, Mike Schock; and in distribution systems, Darren Lytle, be added to the Flint drinking water advisory committee to assist the City/State in determining the best way to proceed to minimize lead in the City's drinking water during the interim use of the Flint River, and subsequent use of Lake Huron water.

Miguel said he will send Mike Schock and Darren Lytle's contact information to Steve and Mike. Steve pointed out that the City is following the LCR requirements, and completing the requirements in a timely manner. Miguel's point is that since the LCR was promulgated 20+ years ago, that research and different situations, like Washington D.C., have educated scientists, experts, and regulators that the existing requirements in the LCR may not be as protective as previously thought. Thus, he can only make recommendations as to how to revise sampling protocols. And Miguel acknowledges that it may be another year before these regulation changes are promulgated in the Long-Term Lead and Copper Rule. In December 2015, the NDWAC recommendation is expected.
R WERE A LEVEL OF CONCERN?
The Region asked the State if the Flint River will be a permanent supplemental source of drinking water, once the City of Flint connects with the Karegdodi pipeline from Lake Huron. Mike Prysby said that the City is currently pumping 22MGD, but the City has 40-50 MG of storage. The City is currently working on reducing its unaccounted for water losses, and these water losses are dropping. The State, through the Governor's office, provided disadvantaged system funding, $2M which includes $900K for lead detection, and pipe inspection.

4. Update on WaterTrack to SDWIS-State: The migration of WaterTrack data to SDWIS-State was number 39 on the Dept of Technology Management and Budget's (DTMB) project list last year; this year it is

number 30. It doesn't appear this project has a high priority. Does the State have any new information on the progress of this project?

Dan said that the migration of WaterTrack data to SDWIS-State has moved to a priority of 26 with DTMB so far this year. But Dan said they are going to take this project out of the que, since Ronda Page has returned to the drinking water program from DTMB. Ronda said she re-estimated DTMB's involvement in this project to be far less than originally thought, so there is no need for any program developers or the tech team. This project will only need the Data Team and the web designers only. Ronda said they can set-up on a new server and migrate the data from WaterTrack to SDWIS-State themselves; in-house. Kris Philip remembers migrating the CWS data to SDWIS-State, so she can be a resource for this project. The parts that are needed to be completed by DTMB could be contracted out. Cary McElhinney said that there is a process of withholding PWSS grant funds and re-directing the funds to a HQ contract with SAIC. Richard Benzie said the process worked well last year when MI used PWSS funds to contract with a HQ contractor to conduct NEEDS survey training.

ACTION: Jen will follow up with State and Tribal Programs Branch about the process and timing of holding back funds from the PWSS grant for the purpose of contracting with SAIC.

5. Consequences of cutting the State drinking water program to a "minimal program"

Jennifer had a discussion with Richard Benzie regarding the possibility of the Michigan State Legislature looking to have just a minimal drinking water program, meaning only a program with activities that are required by the Federal SDWA. Jennifer ultimately discussed this internally with Tom Poy. The minimal program suggested would cut out Operator Certification, Capacity Development, Plan Review, Cross Connection Control, Source Water Protection, among other programs that are State required. Operator Certification and Capacity Development, while not required by the Federal regulations, do have financial strings attached. And Plan review/construction permits are required by the SRF program for a loan. Any recent communication with the State Legislature that they might proceed and make this possibility a reality?

Richard and Liane said there is no current threat from the State Legislature to cut the State-funded PWSS program activities. But there is a State-wide impetus to delete old programs and regulations, so this could lead to questioning the purpose of State-funded PWSS program activities. Richard is just being proactive in preparing a justification. Richard remembers a discussion many years ago about what constitutes a "comprehensive drinking water program". Tom Poy and Jennifer commented in a previous communication with Richard that the EPA PWSS primacy program and the State-funded activities in the drinking water program were meant to complement each other. To support this statement, Jennifer sent Richard some PWSS Priority guidance from the 90's, some preamble language from the 1976 SDWA found by our attorney, and language from Section 142 of the SDWA regulations from 1976 that might assist him in his justification.

6. EPA's Resource Message at the LHD Workshop in April

From the 2014 analysis of Shared Goals 2013 data, which is compliance data, for noncommunity systems, there are increasing trends of nitrate M/R violations for both NTNCWSs and TNCWSs. We discussed this on the last semi-annual call. Analysis of the 2015 Shared Goals 2014 data (April 2015) shows an improvement—that of decreasing numbers of bacti/nitrate M/R violations.

However, in light of the upcoming implementation of RTCR in 2016, the question raised here in the Region is:

Does the State have a plan with the LHDs as to what activities must be prioritized, and what will fall off the plate? Not all LHDs will need to disinvest based upon each LHD's resources, but some poorly funded LHDs may have to disinvest in some activities/drop activities that have no risk to public health.

Carrie Monosmith said that she met with the RTCR workgroup, comprised of LHD Directors/sanitarians, last fall to identify activities that the state can disinvest in during the next several years as the LHDs begin implementation of RTCR. They could not identify any activity that could be dropped. The main thing that will help the LHDs save time is to get the electronic DWR (eDWR) going, or the CMD portal, which will drastically reduce the LHDs time in inputting laboratory data into WaterTrack/SDWIS-State. From there, they can develop electronic data forms (CROMEER compliant) that the systems can submit.

Thank you!

Jennifer

shekterl@michigan.gov; 'Richard Benzie' <benzier@michigan.gov>; 'kris philip' <philipk@michigan.gov>; 'Monosmith, Carrie (DNRE)' <MONOSMITHC@michigan.gov>; 'DeBruyn, Dana (DEQ)' <DebruynD@michigan.gov>; Dettweiler, Dan (DEQ) <DETTWEILERD@michigan.gov>; Poy, Thomas <poy.thomas@epa.gov>; Kuefler, Janet <kuefler.janet@epa.gov>; Damato, Nicholas <damato.nicholas@epa.gov>; Shoven, Heather <shoven.heather@epa.gov>; Murphy, Thomas <murphy.thomas@epa.gov>; Bair, Rita <bair.rita@epa.gov>; McElhinney, Cary <mcelhinney.cary@epa.gov>; Pniak, Edward <pniak.edward@epa.gov>; 'cookp@michigan.gov'; 'Prysby, Mike (DEQ)' <PRYSBYM@michigan.gov>; Busch, Stephen (DEQ) <BUSCHS@michigan.gov>

CK

Krisztian, George (DEQ)

From: Crooks, Jennifer <crooks.jennifer@epa.gov>
Sent: Monday, June 08, 2015 11:19 AM
To: Shekter Smith, Liane (DEQ); Benzie, Richard (DEQ); Philip, Kris (DEQ); Cook, Pat (DEQ); Busch, Stephen (DEQ); Prysby, Mike (DEQ); DeBruyn, Dana (DEQ); Monosmith, Carrie (DEQ); Dettweiler, Dan (DEQ)
Cc: Poy, Thomas; Bair, Rita; Damato, Nicholas; Shoven, Heather; Murphy, Thomas; Porter, Andrea; Deltoral, Miguel; Kuefler, Janet; McElhinney, Cary; Noureldin, Mostafa
Subject: Agenda for MI Semi-Annual Call on Wed 6/10 at 10am EST; 9am CST

Importance: High

Good morning! Below is the Agenda I came up with for our semi-annual call this Wed morning. Please let me know if you would like to add additional items for us to discuss. Please note that I have invited Steve Busch, Mike Prysby and Pat Cook to discuss item no. 3 regarding Flint.

Jennifer

Agenda Topics for Michigan Semi-Annual Call on Wednesday June 10, 9am CST

Call-in no: **PPI**
Code: PPI

1. Changes in Lead Disinvestments and Commitments for FY 2016 ARDP—for discussion: Due to our extreme focus on lead in drinking water, this is the consensus here.
   a. Consumer notification of tap results at NTNCWSs:
   (Suggested wording) The NCWS program commits to full implementation of the lead consumer notification of tap results requirement, to begin in CY 2016. Region 5 will assist in a notification outreach effort in late FY 2015 to remaining 698 NTNCWSs that are not schools/daycares, to begin providing lead consumer notice in CY 2016. NCWS program commits to include information on providing lead consumer notice in the annual monitoring letter sent to all NTNCWSs for CY 2016.
   b. Collection of Lead samples at NTNCWSs during June – September 2016 timeframe
   (Suggested wording) NCWS program commits to including information in the applicable NTNCWS annual monitoring letters of the requirement to collect their annual/triennial lead sample between June and September only, during CY 2016. The MDEQ currently does not have the capability to track lead sampling compliance within this specific timeframe.
   c. Follow-up Actions for NTNCWSs that sample outside of June-September 2015 timeframe
   (From 5/5/15 call notes w/EPA) MDEQ commits to providing Region 5 with all CY 2015 lead (and copper?) sample data for all NTNCWSs by March 2016 so that EPA can analyze how many PWSs monitored outside the June through October timeframe. EPA commits to follow-up with MDEQ to discuss follow-up actions.
   d. Submittal of the lead and copper reporting form
   (Suggested wording) MDEQ commits to requiring CWSs and NTNCWSs to submit the lead and copper reporting form via the annual monitoring letters to each system, tracking CWSs and NTNCWSs submittal of the lead and copper reporting form, and commits to issuing violations for failure to submit the lead and copper reporting form. The reporting form provides the address of the sample site, designates sampling site selection criteria, and explanation(s) for any changes in sampling sites.

2. Enforcement Update with Heather

   NTNCWSs under Bottled Water agreements due to Arsenic MCL violations:

   Per discussions with Region 5 and the February 2014 EPA/OECA memo, MDEQ has closed the old Arsenic open-ended MCL violations; however, no further quarterly monitoring is being conducted at the (+27) systems that are still under bottled water agreements. Thus, no more arsenic MCL violations will be reported for these systems and these systems will not become priority systems (ETT score of 11 or more) since only one arsenic MCL violation will be reported (5 points) even though they have a longstanding issue with arsenic noncompliance. The Region would like to discuss the pros and cons of placing these PWSs with arsenic MCL violations on quarterly monitoring as required under 40 CFR Section 141.23(c)(7); and brainstorm possible solutions.

3. Status of Flint

   a. TTHM levels for May—Due to MDEQ district engineer June 10

   b. Lead in Flint

   Our discussions with MDEQ indicate that no phosphates/corrosion control has been added to the system since April 2014 when the source of drinking water changed to the Flint River. We understand that the City is just finishing up its second set of 6-month initial monitoring for lead; where the results will probably warrant a Corrosion Control Study to be conducted. Since Flint has lead service lines, we understand some citizen-requested lead sampling is exceeding the Action Level, and the source of drinking water will be changing again in 2016, so to start a Corrosion Control Study now doesn't make sense. The idea to ask Flint to simply add phosphate may be premature; there are many other issues and factors that must be taken into account which would require a comprehensive look at the water quality and the system before any treatment recommendations can/should be made. Miguel is recommending MDEQ and EPA? approach Flint about formally requesting EPA's Office of Research and Development in Cincinnati support on the lead in Flint drinking water issue, and request that Mike Schock, ORD, and possibly Darren Lytle, ORD, to participate in Flint's drinking water advisory committee so that a comprehensive evaluation on how to proceed can be discussed.

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5. Consequences of cutting the State drinking water program to a "minimal program"

   Jennifer had a discussion with Richard Benzie regarding the possibility of the Michigan State Legislature looking to have just a minimal drinking water program, meaning only a program with activities that are required by the Federal SDWA. Jennifer ultimately discussed this internally with Tom Poy. The minimal program suggested would cut out Operator Certification, Capacity Development, Plan Review, Cross Connection Control, Source Water Protection, among other programs that are State required. Operator Certification and Capacity Development, while not required by the Federal regulations, do have financial strings attached. And Plan review/construction permits are required by the SRF program for a loan. Any recent communication with the State Legislature that they might proceed and make this possibility a reality?

6. EPA's Resource Message at the LHD Workshop in April

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   However, in light of the upcoming implementation of RTCR in 2016, the question raised here in the Region is: Does the State have a plan with the LHDs as to what activities must be prioritized, and what will fall off the plate? Not all LHDs will need to disinvest based upon each LHD's resources, but some poorly funded LHDs may have to disinvest in some activities/drop activities that have no risk to public health.

Jennifer

Department of Utilities

FLINT WATER PLANT

Memorandum

To: Water Plant Personnel

From: Mike Glasgow
Utilities Administrator

Date: October, 22 2015

Subject: **Laboratory testing requirements for current water supply**

Due to the recent change in water supply, the drinking water testing for the water plant laboratory personnel has been adjusted. The testing has been arranged to reflect what was conducted in years prior to operation of the treatment plant from the river. There are a few additional items that have been included, and this schedule may be adjusted as necessary.

AM & PM PLANT RUN:

- Collect & analyze samples for chlorine residual and Coliform Bacteria in the morning and afternoon (at least 4 hours apart) from the following sites on plant grounds:
  Control Station # 2, Dort Well, Pump Station # 4, & Lab Tap

LAB TAP TESTING:

- Collect & analyze lab tap samples once daily for pH, fluoride, total hardness, alkalinity, non-carbonate hardness, calcium, magnesium, total phosphate, temperature and chloride.
- Collect & analyze 3 samples daily (at least 3 hours apart) for Turbidity.
- Collect & analyze 1 sample weekly for Heterotrophic bacteria.

DISTRIBUTION SAMPLING:

- Collect & analyze samples from the 10 distribution sites at least twice weekly for chlorine residual and coliform bacteria. A total of at 100 samples must be collected and analyzed each month, so in total, at least 10 sampling events should take place each month.
- Once weekly also test each distribution site for fluoride, total phosphate, and Heterotrophic bacteria.
- Once quarterly perform Water Quality Parameters (WQM) from the 25 distribution sites. Total phosphate will be a new addition to all the other parameters tested.
- Once quarterly collect Disinfection Byproduct samples (DBP) from 8 sites according to the current DBP schedule. Next sampling will take place the 3rd full week of November.
- Lead & copper sampling will be on going throughout the rest of the year, a detailed plan will be completed soon.

RIVER SAMPLING:

- When time permits, a river sample should be collected once weekly and analyzed for coliform bacteria, pH, fluoride, total hardness, alkalinity, non-carbonate hardness, calcium, magnesium, temperature, turbidity, and chloride.

Flint Water Plant & Facilities 4500 N. Dort Hwy. Flint, MI 48505 Phone: (810) 787-6687 Fax (810) 787-2710

To: Prysby, Mike (DEQ)
Subject: Flint WTP PH2 SEG4 - Corrosion Control

Hi Mike,

Please see attached plans for the Corrosion Control Plan for the City of Flint. I will have the official submittal package to you tomorrow afternoon after I get Brent or Mike's signature on the permit application. I will call you when I get back in Lansing to drop the package. Is three sets of full size plans adequate? Would you like some half size plans? Let me know.

Basis of Design

Given that Flint will require lead and copper corrosion control and given that Detroit utilizes orthophosphate for their corrosion control methodology, and that Flint will be receiving Detroit water for the immediate future, orthophosphate is the appropriate corrosion control methodology for Flint. A dosage of 0.8 mg/l as PO_4 has been recommended for the Detroit water. Numerous utilities utilizing Lake Michigan water have a target dosage of 0.9 mg/l as PO_4. Therefore, a target dosage in the range of 0.8 to 0.9 mg/l appears appropriate.

It is expected that, at least initially, there will be a significant PO_4 demand in the system. This will require a significantly higher dosage until this demand is satisfied and the target residual can be maintained. We are therefore designing for capability of a maximum dosage of 1.5 mg/l.

The arriving Detroit water will likely have some residual PO_4 when it arrives at Flint. It has been reported that this residual will be approximately 0.4 mg/l. The system must therefore be capable of a minimum dosage of 0.4 mg/l.

Based upon the usage of 75% Phosphoric Acid and a flow range of 4 MGD to 25 MGD, with an average day of 16 MGD, the expected feed rate will be 1.35 to 32 gpd. Average Phosphoric Acid feed is expected to be 10.8 gpd, requiring 30 days storage of 325 gal.

Orthophosphate will need to be applied at two locations. Detroit water will enter the Flint system at Control Station CS2, and supplementary phosphate will be applied there. However, on occasion some incoming water may need to be diverted to the Dort Reservoir, bypassing CS2. This water would then be introduced to the system through High Service Pump Station PS4 and phosphate would be introduced at this location.

Please let me know if the information is adequate or you require additional information.

Thanks,

Samir F. Matta, PE

Krisztian, George (DEQ)

To: Krisztian, George (DEQ)
Subject: RE: Flint meeting

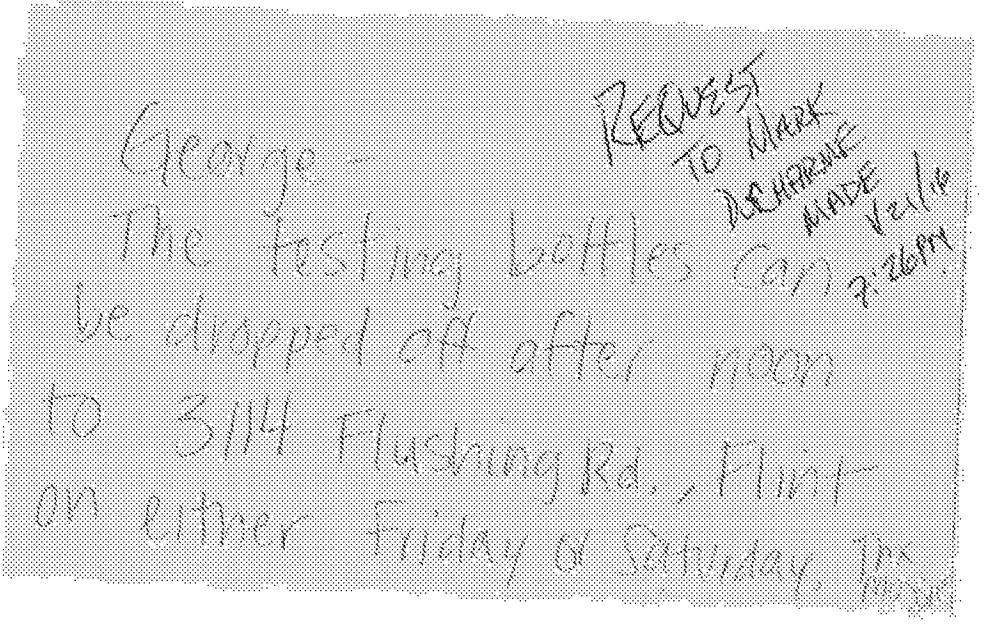
9:15 am Wed

Discuss how reports are being sent to residents

Discuss sentinel points for lead monitoring

Discuss having DEQ staff visit WTP to discuss switch to KWA

Discuss/Show Video



Flint Drinking Water

Media Q&A

Oct. 8, 2015

Switch to Great Lakes Water Authority

What finally pushed the state to this decision?
This was the City's request, and the Governor supports it, based on several key factors: In the near term, DWSD water will be easier to manage. It comes from a more stable source than the river, it is fully optimized for corrosion control, and it is clear that residents of Flint have more confidence in this water source.

Will this solve Flint's water crisis?
In combination with the other short term, intermediate term and long-term steps outlined last week, this move represents a big step forward. Flint still has serious system maintenance challenges it must address.

If you're saying residents will still have lead because of their plumbing, does that mean every other city in this state has a lead problem?
Many areas of the state have lead in their infrastructure mix.

Where's the state getting the money to fund this?
We have submitted a formal request to lawmakers via the appropriations process.

Where's the city getting the money to fund this?
The city is contributing all it can, and is getting assistance for its match from the Mott Foundation.

How long will the switch take?
The switch will be completed by the City and Great lakes Water Authority, but our understanding is that it can be accomplished in the very near term once the arrangements are complete.

How long will it take before Detroit's corrosion controls provide protection for Flint?
It will take some time for the corrosion control additives to build on pipe walls throughout the system. Estimates vary. The state can assure we will commence monitoring of the system early 2016 and report results as we get them to keep the community updated.

Why do residents still need to use filters and bottled water?

The filters and bottled water are responsible precautions for any resident concerned about lead exposure.

Do the filters actually work? We've been hearing they don't protect for lead.
Yes, the filters work. They are all certified for lead removal by the National Sanitation Foundation.

The filters are only good for 100 gallons. What happens when they are used up?
They will need to be replaced. And residents can get a new filter.

What about restaurants?

What's going to be done about lead service lines?
Long term, this is the only permanent solution to lead exposure. The state has committed to helping the city accomplish this goal long term.

Do you wish you'd made this switch sooner?
We support the City's decision. We can't look backward. We feel the state has responded quickly and effectively as information has surfaced, been investigated and verified. While the City of Flint is, right now, in compliance with the federal Lead and Copper Rule, we recognize there is a disparity between surveillance testing and other testing happening in the community that we need to better understand and we are working on developing our knowledge.

Schools testing

What do these results say?
The results say we need to further investigate Flint schools and help the schools find clearer causes for some the results we got.

Any theories about what's going on?
It is possible there are specific points in the plumbing that have lead components which need to be replaced, but we can't say anything definitively until we perform an investigation at each school.

Do the schools have lead service lines? If not, why are they getting such high results?
The schools we tested initially do not have lead service lines. There are a few possible reasons why lead is being detected at specific points in the buildings and not others. When we know things definitively, we will make the information public.

How long do the schools have to stay on bottled water? Just until the switch to Detroit, or longer term?
We are encouraging the schools to continue their current protective measures as a precaution until we can get into the buildings and get more answers.

Why did you only test 13 schools?
That was what the Flint Public Schools requested.

What happens to other schools?
We will test all the schools in Flint if they request it.

What about the schools that can't afford to update their entire plumbing systems?
This is why we are having plumbing assessments completed. There is no way to know yet what each building will require.

How confident are you in your testing? You've got results all over the map.
We are confident that our testing meets the requirements for the federal Lead and Copper Rule, which is surveillance monitoring. The bigger question is whether surveillance monitoring meets the public health protection standards that Lead Exposure Testing methods do. The EPA is working on that question now, and we are engaged in that dialogue.

What do you mean by "health exposure testing"? What are you doing next?

The 90th percentile of your results is still below 15 ppb. Does that make you more or less confident in your testing and in your protocols?
It makes us confident that the testing protocol delivers consistent results. But again, it does raise questions about whether this testing method shows what people think it does or what they really want to know, which is actual lead exposure from lead plumbing in a home.

Any idea how long kids have been exposed to lead? Was it before the move to the Flint River?
That is possible. We don't know.

How does the state bring this new information into the broader picture of kids' lead exposure across the state?

!! WRITING & PROOFING !!

BROWNELL STEM ACADEMY

Outlet Sampling and Plumbing Assessment Recommendations

6302 Oxley Drive, Flint, Michigan 48504

- PLUMBING ASSESSMENT PROTOCOL FOR DAY CARES
  INFORMATION NEEDED?
  LET DLARA LEAD
- SAMPLING
  ENLIST LAB STAFF
- REPORT WRITING
  ENLIST OEA
- DAY CARE FACILITIES
  ENLIST GCHD / DLARA

UTILIZE ETC FOR DAYCARES?
TALK TO LINDA
CAN WE MAYBE PIGGYBACK

DEQ

DRAFT – WORK IN PROGRESS

Protocol for Collecting Water Samples at Homes for Lead Analysis for an Exposure Assessment

The following procedure is to be used by the Michigan Department of Health and Human Services to ensure samples from homes on city of Flint water are collected in a systematic, consistent manner to provide meaningful results when performing an elevated blood level (EBL) investigation. By following the below procedures, health officials will have information to provide to a resident to be able to identify and correct sources that contribute lead into drinking water. The sampling procedures being used are:

- Conduct an on-site assessment of the building plumbing to identify plumbing components of concern.
- Select sample sites based on which taps are primarily used for drinking and cooking. At a minimum, the kitchen sink must be used and a second tap, most likely a bathroom, selected based on the most use.
- Label each tap with a unique code.
- Collect small volume samples from each sampling site beginning with any taps other than the kitchen. Finish collecting small volume samples from the kitchen tap as described below.
- Collect large volume samples from the kitchen tap.
- Submit the samples and appropriate paperwork to a certified drinking water laboratory.

Step 1 – On-Site Plumbing Assessment

Upon arrival on-site, some items to look for and note:

- Identify where the water service enters the building. Typically, this will be where the meter is located.
- What is the service line material made of? Options include: lead, galvanized, copper, or plastic.
- What year was the home built?
- Have there been additions? If built since 1986, were lead-free plumbing and solder used?
- What are the potable water pipes in the facility made of and what is their location? Options include: lead, brass, copper, plastic, galvanized metal and other materials. What materials were used to solder the potable water pipes in the system? Are brass taps, fittings or valves used? Note the locations.
- How many of the following outlets provide water for consumption: Kitchen taps, bathroom taps, and icemakers. Note their location. Include taps that might be used for making coffee or preparing formula.
- Do faucets have accessible screens and have they been cleaned?
- Is any electrical equipment grounded to water pipes?
- Are there any records of previous water testing?

Step 2 – Identify Taps to be Sampled

- Include a second tap/faucet based on what is primarily used. Most likely this will be a bathroom.
- Sample the secondary (most likely a bathroom) tap first. Only small volume samples will be taken here.
- The kitchen faucet must be sampled last because small volume and large volume samples will be taken from this tap.
- Only cold water taps should be sampled.

Each sampling location must be given a unique sampling code. A sample site identification (ID) number for each sample site will identify the order in which each site is to be sampled. The ID number will reflect the type of tap/outlet and location. Each sampling location will be documented with digital photos, if possible. If potential brass devices are seen they should be noted.

Step 3 - Labeling the Sample Sites and Preparing Labels for the Bottles

The following sampling identification scheme is recommended:

- KC = kitchen faucet, cold
- BF = bathroom faucet

In addition to the unique outlet code, a unique sample identifier is necessary since multiple samples will be taken from each faucet.

For example, there will be two small volume first draw samples taken from each faucet. Small volume first draw samples should be labeled in order of collection P1 and P2. If these samples are collected at a bathroom faucet the sample identifier would be BF-P1 and BF-P2.

Large volume consecutive samples taken at the kitchen faucet (after the small volume samples were collected) should be labeled A1 through A10. For example, the first consecutive sample at the kitchen sink would be KC-A1 and the second sample would be identified as KC-A2 … through KC-A10.

Step 4 – Prior to Sample Collection

The evening prior to samples being collected, residents in the home must be instructed to not use any water in the house after midnight. No water should be disturbed for any purpose prior to samples being collected. The minimum stagnation time should be 6 hours and it should not exceed 18 hours.

Sampling staff should confirm when they arrive in the morning that no water has been used in the home since the evening before.

Step 5 – Collect the Small Volume Samples

Sampling containers will be provided by the Michigan Department of Environmental Quality (MDEQ) Drinking Water Laboratory.

1. Collect all water samples before proceeding with normal use of the water supply. Ideally, the water should sit in the pipes unused for at least 6 hours but not more than 18 hours before a sample is collected.
2. Two small volume samples [125 milliliter (ml) samples] will be collected from each designated sample site. Sample units for this evaluation/survey will be designated 32CC.
3. Notes should be taken at each sampling location regarding any treatment device that may be present (e.g., is there an in-line filter at that location) and whether the outlet/tap has an aerator present. Document other noteworthy items for each location such as leaky faucet, rust-stained sink, etc.
4. **DO NOT REMOVE THE AERATOR IF THERE IS ONE, but make a notation that there is an aerator present.**
5. The two small volume samples from each site are to be collected as follows:
   a. Before beginning the sampling process, write on each sample bottle's green label an identification code according to the sample tap coding, and type of sample collected (i.e. P1, P2) using a black Fine Point Sharpie permanent marker. To ensure clarity for the DEQ lab data coders draw a slash mark through each zero, the number one is a straight vertical line (no hat or foot), and cross each number seven.
   b. Next, using a red Sharpie permanent marker, write '1' on the white cap of the sample unit marked as P1; write '2' on the cap of the unit marked as P2.
   c. Complete the Request for Analysis forms for each sample using a pen, pencil or black Sharpie. If the testing parameter is not already populated for Lead and Copper analyses, mark as 32CC for the 125 ml sampling units.
   d. Make sure to collect the water samples in this order: "P1" for the very first-draw and "P2" as the second first-draw.
   e. Place the first bottle under the tap, open the tap to produce a slow, steady "pencil thin" flow and fill the first bottle (P1) to the appropriate level and immediately fill a second bottle (P2) without a break in stream (do not turn off the tap between the first and second bottle and do not allow water to run down the drain in between the first and second bottle).
   f. Turn off tap. Cap each sample unit checking to make sure to match P1 unit to '1' white cap, P2 unit to '2' white cap.

6. Secure the appropriate request for water analysis form to the appropriate bottle (refer to the example bottle provided for "instructions") with a rubber band.

7. Bundle the two samples collected at each individual sampling location (after the proper paperwork has been banded to each bottle) and secure the two samples together with a single rubber band.

8. Collect the remainder of the samples from the kitchen faucet.

Step 6 – Collect the Large Volume Samples

Once all small volume (125 ml) samples have been obtained, sampling will begin to collect ten consecutive/sequential 1 liter samples at the kitchen faucet.

At the kitchen faucet location, the procedure to collect ten consecutive/sequential 1 liter samples is as follows:

1. Assemble 10 1-liter 36CC sampling units labeling with a Sharpie marker on the neck or bottle cap to indicate order of collection (example: A1, A2, A3 …. A10.
2. Before beginning the sampling process, write on each sample bottle's green label an identification code according to the sample tap coding, and type of sample collected (i.e. KC-A1, KC-A2) using a black Fine Point Sharpie permanent marker. To ensure clarity for the DEQ lab data coders draw a slash mark through each zero, the number one is a straight vertical line (no hat or foot), and cross each number seven.
3. Complete the Request for Analysis form for each bottle using test code 36CC.
4. Begin sampling the first 1 liter bottle similar to a first draw sample.
5. Fill ten 1 liter bottles consecutively without letting the water run down the drain. MAKE SURE TO HAVE A SMALL AMOUNT OF HEADSPACE TO ALLOW FOR THE EXPANSION OF ICE.
6. Wrap each request for water analysis form around the appropriate bottle and use a rubber band to secure it.
7. Deliver all sample bottles to the DEQ Drinking Water Laboratory.

Step 7 - Laboratory Performs Analysis

Samples delivered to the DEQ Drinking Water Laboratory will be analyzed in accordance with the Laboratory Services Standard Operating Procedure (SOP) Document SOP #800 Revision #4 Effective Date 10/2015.

Applicable analytical methods will be in accordance with the Method for Determination of Metals in Environmental Samples, Supplement I, U.S. Environmental Protection Agency, Method 200.8, 1999 Revision 5.5.

All Method Detection Limits shall be performed according to Title 40 of the Code of Federal Regulations, Part 136, Guidelines Establishing Testing Procedures for

the Analysis of Pollutants, Appendix B, Definition and Procedure for the Determination of the Method Detection Limit.

Analytical quality control will be in accordance with SOP #800 Revision #4.

Residential Drinking Water Sampling Protocol
Agenda
November 5, 2015

1. Introductions

2. Overview of EBL investigations and case management (HHS)

3. Overview of water sampling protocols (DEQ)

4. Discussion

5. Logistics

    a. Sampling supplies
    b. Handling and packing for transport to the lab
    c. Results reporting

Flow/coordination of EBL cases

- MDHHS (Bob Scott) will send an updated list of EBL children in Flint weekly
- GCHD (Sherry) will review list and assign EBL cases to CM
- Sherry will send contact information via email to MDHHS-Courtney
- MDHHS-Courtney will review and send to ETC (EBL Environmental Investigator (EI) Contractor) and an EI will be assigned to the case.
- GCHD CM will contact family to determine available scheduling dates/times.
    - CM will discuss how the family must prepare for the site visit, including the water sampling prep using following three step process to collect water samples:
        a. Scheduler will attempt to ensure water is not used for at least six hours prior to Contractor arrival in order to collect first draw water samples. The Contractor will send the family instructions on water use prior to the visit.
        b. If this step is unachievable, Contractor will ask family not to use the water during the site visit and will stay at the unit for a minimum of six hours and collect the first draw water sample at that time.
        c. If this step is unachievable, Contractor will schedule a return visit for early morning time to collect the first draw water samples.
- GCHD CM will contact John DeFabio at ETC 800-864-3236 and coordinate schedules to attend the initial site visit together.
- **On-site:**
    - The EI will draw water samples first thing to allow for family to use water thereafter.
    - The EI will conduct the Occupant Questionnaire
    - The EI will begin investigation, while
    - The CM provides case-management services to the family, including the presentation of the lead dust cleaning kit and associated education. If a HEPA vac is available through the EI, the CM will teach the family how to use the vac safely. Hopefully, this can be done while the EI is conducting the investigation and the vac can be taken back with them to alleviate pick up.
    - When the CM has completed the visit, she will leave the site. The EI will continue the investigation until complete. The CM will explain the procedure to the family prior to the first visit.
    - The EI will screen the family for eligibility into the MDHHS-Lead Safe Home Program (LSHP) for abatement of lead-based paint hazards (I have attached our LSHP application packet with eligibility requirements listed on the flier).
        1. If the family appears eligible for the LSHP, the application will be submitted to Courtney for processing.
        2. If the family is enrolled in the LSHP, Courtney will notify Sherry/CM via email.
        3. For the families that do not qualify for the LSHP, referral to other resources will be provided, if available.
    - The EBL Environmental Investigation is not reimbursed by Medicaid, therefore, MDHHS or ETC will not bill Medicaid for any services.

- GCHD requested that ETC provide the CM with a summary letter of the EI findings. Courtney confirming with ETC that this is possible.
- The CM is expected to perform at least two case-management visits and will continue to visit (home and phone) the family until the EBL child has two blood tests below 5 ug/dL.
- There are current testing events set-up with GCHD as follows:
    1. November 5 at GCHD-Burton Location from 8-12 noon and 1-4 pm.
    2. November 12 at Brownell School from 3-6 pm.
    3. ETC can be available to answer questions regarding investigations at some testing events.
- If an LSHP application is received at MDHHS for Flint and has an EBL child, Courtney will contact Sherry to see if any services have been provided by GCHD. If yes, MDHHS will order and EI. If no, ETC and the CM will coordinate schedules as discussed above.
- MDHHS CLPPP is providing training to the GCHD CM's on November 10, 2015. ETC and MDHHS staff will attend for a meet and greet of staff.

DRAFT FLINT RESIDENTIAL HIGH LEAD SAMPLING PROGRAM

Residents throughout the city of Flint have conducted lead and copper sampling at their homes with their water analyzed by the MDEQ laboratory. Those residents where the level of lead in the water exceeds 100 parts per billion of lead will be offered an opportunity to be part of the high lead sampling program. Initial site visits will be made by a DEQ/DHHS team – within 48 hours where the lead result was >150 ppb and 7 days where the lead result was >100ppb.

The residents will be contacted via telephone or email based on their preference to set up a visit to their home. The High Lead Sampling Team (Team) will consist of a DEQ employee, a plumber from the local union and a resident of the city of Flint. The number of teams will be determined based on the number of homes to be visited. This number will vary over time. Initially XX teams will be assigned to address those residents who have already received their test results.

The plumber will be doing an evaluation of the plumbing system in the house, noting any filter systems, water softeners, service line material where it enters the home, etc. They will also assure that any filters are fresh and that the aerator for the faucet is clean. The DEQ employee will work with the resident to explain the sampling process and work through the filling in of the sample form. They will leave an example form for the resident sampler for future reference. The data generated by the plumber and the DEQ employee will be entered into an electronic collection tool along with a photo of any plumbing of interest and the sampling point that has been chosen. Bottled water and filter cartridges will also be provided at the time of the visit.

The Team will work with the resident to establish a sampling date. The need to have the water sitting undisturbed in the pipes will be re-iterated.

Sampling training is scheduled to begin on Tuesday, February 16, 2016.

DRAFT

DRAFT FLINT RESIDENTIAL SENTINEL SAMPLING PROGRAM

Residents throughout the city of Flint have agreed to conduct ongoing sampling with their water to be analyzed by the MDEQ laboratory. These residents will be part of the sentinel sampling program and samples will be collected every two weeks. Analysis will be for lead and copper.

The residences have been chosen for this process using various criteria to assure a good distribution of sampling points throughout the city drinking water supply system.

Initially, where possible, attempts will be made to contact the residents via telephone to set up a visit to their home. The Sentinel Sampling Team (Team) will consist of a DEQ employee, a plumber from the local union and a resident of the city of Flint. Ten Teams will be deployed. The number of teams will be determined based on the number of homes to be visited. Once the Team has worked through all of the addresses where meetings were scheduled they will move down their list of sentinel residences to see if they can find other residents at home.

The plumber will be doing an evaluation of the plumbing system in the house, noting any filter systems, water softeners, service line material where it enters the home, etc. They will also assure that any filters are fresh and that the aerator for the faucet is clean. The DEQ employee will work with the resident to explain the sampling process and work through the filling in of the sample form. They will leave an example form for the resident sampler for future reference. The data generated by the plumber and the DEQ employee will be entered into an electronic collection tool along with a photo of any plumbing of interest and the sampling point that has been chosen. Bottled water and filter cartridges will also be provided at the time of the visit.

The resident will be advised of the sampling date (targeting Monday mornings). The need to have the water sitting undisturbed in the pipes will be re-iterated.

Sampling training is scheduled to begin on Wednesday, February 10, 2016 with the first sampling round to take place on Monday, February 15, 2016.

TAKING ACTION ON FLINT WATER

- The Action Plan -

- Immediately test all Flint public schools to ensure that **drinking water is safe.** Testing will also be available at no cost to any other school in Flint.
- **Expand health exposure testing** of individual residences.
- **Offer water testing** at no cost to Flint residents to assure water is safe.
- **Expedite optimizing corrosion controls** in the Flint drinking water system.
- **Assemble the "Safe Drinking Water Technical Advisory Committee"** to ensure the best technology, practices and science are being utilized, and add an expert from the EPA's Office of Research and Development to the group.
- **Accelerate water system improvements** to address replacement of lead service lines.
- Expedite completion of **Karegnondi Water Authority.**
- Gov. Rick Snyder names Dr. Eden Wells as the Flint Drinking Water Public Health Advisor to ensure safe drinking water.
- **Provide water filters** to residents of Flint.
- Expand a comprehensive lead education initiative.

To get your water tested for free, please call the city of Flint Water Plant at (810) 787-6537 and then press 1

Visit www.mi.gov/FlintWater for more information

Krisztian, George (DEQ)

From: Shekter Smith, Liane (DEQ)
Sent: Saturday, November 14, 2015 1:15 PM
To: Krisztian, George (DEQ)
Cc: Prysby, Mike (DEQ); Thelen, Mary Beth (DEQ); Shaler, Karen (DEQ); Busch, Stephen (DEQ); Sygo, Jim (DEQ); Devereaux, Tracy Jo (DEQ); Benzie, Richard (DEQ); Anderson, Madhu (DEQ)
Subject: Action Steps Reporting for Week of 11/9 - 11/13

Karen – I looked for the Action Steps chart in the folder and couldn't find a chart for this week. Not sure why not.....

Below is an update of the Action Steps worked on during the week of November 9th - November 13th.

Action Step No. 2: Introduce legislative changes to Part 54 of NREPA – Drinking Water Revolving Loan Fund:

Meeting scheduled for November 20th between Executive Division staff and program staff to discuss draft changes.

Action Step No. 3: Assist After Action Review Panel: *(not sure whether Madhu has been filling this out or not)*

Draft Timeline shared with Task Force *(check with Madhu for the date).*

Outline of DEQ Actions drafted for delivery to Task Force.

Action Step No. 7: Follow-up with city of Flint regarding corrosion control treatment and their plans to address requirements and options provided for in 10/30/15 DEQ letter:

DEQ staff discussed corrosion control dosages and monitoring requirements in more detail with the city and their consultant during the Technical Advisory Committee (TAC) meeting on 11/9/2015. Orthophosphate dosage concerns brought to the table by the city's consultant were addressed by DEQ and EPA staff.

Action Step No. 8: Follow-up with the city regarding installation of corrosion control:

DEQ staff followed-up with city during the TAC meeting regarding installation of corrosion control confirmed that the chemical feed pumps have been ordered and delivery is approximately two weeks out. WTP operators are currently installing the feed system piping and water booster pumps. The city anticipates have the corrosion control feed system installed and ready for operation by the end of this month.

Action Step No. 9: Review Monthly Operation Reports (MORs) for Standby Operation of Flint WTP with the city of Flint; draft letter to city of Flint documenting Standby Operation requirements:

DEQ staff has drafted a letter that establishes standby operation (test-run) requirements for the Flint WTP based upon the city's previous test run MORs. The draft letter also discusses the potential for Flint to obtain a limited supply of raw water directly to the WTP from KWA (prior to spring 2016) for treatment evaluation. The draft letter will be finalized and sent to the city early next week.

Action Step No 10: Work with KWA and other agencies to address bottleneck issues; check weekly for status updates:

DEQ staff discussed the most recent stop work orders issued by the Lapeer County Road commission with Genesee County during the TAC meeting. The county is continuing to install the pipeline and is working with the road commission to correct the soil erosion control issues. The county has not expressed a concern of this delaying their construction schedule.

Action Step No 11: Continue evaluating city of Flint Service Line Record status and comparison to sampling pool:

DEQ's letter was sent to the city on 11/9/2015. The letter requests the city to provide additional information/documentation concerning discrepancies between the water service line material reported in the Lead/Copper Reporting forms and the water service line material reported in digitized water service index cards. The city must also complete the correlation for all of the remaining lead/copper sampling locations that were used since the start of monitoring under the LCR in 1992. Any additional further discrepancies must be explained. The city must complete this task by December 29, 2015.

Action Step No. 13: Develop draft sampling protocol for residential exposure assessment for DHHS:

Draft protocol shared with DHHS on November 10th.

Action Step No 15: Attend TAC meeting on 11/9/15

DEQ staff, Jim Sygo and Michael Prysby attended the TAC meeting on 11/9/15. Mr. Prysby participated in the meeting as described in the Action Steps above. Mr. Sygo presented DEQ's findings of the results of the lead sampling conducted at the Freeman Elementary school.

Action Step No. 17: Conduct Plumbing Assessments at Durant-Tuuri-Mott Elementary and Central Kithen:

DEQ and DLARA staff completed plumbing assessments at both locations on Friday, November 13th.

Action Step No 18: Conduct sampling at Durant-Tuuri-Mott Elementary and Central Kitchen:

DEQ staff are scheduled to complete this task on Saturday, November 14th.

Flint Drinking Water Action Plan Update

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

- A meeting has been confirmed for October 27 with DHHS to discuss all lead education material for schools.

- DEQ staff discussed with the city of Flint's consultant, Lockwood, Andrews & Newnam, Inc., the remaining items that are needed for issuance of Michigan's Safe Drinking Water Act (Act 399) construction permit. Staff anticipates receiving these items on October 27.

- DEQ staff obtained approximately 10,895 records from the city of Flint's GIS system regarding service line index cards and extracted them into a table format for additional data review. Data review has been initiated by DEQ's Lansing District Office staff.

- DLARA and DEQ staff tentatively plans to conduct plumbing assessments at Brownell K-2 STEM Academy and Eisenhower Elementary School on October 30. DLARA staff will contact the Flint Community Schools' facility administrator to confirm the date and approximate times.

Additional Actions:

- All of the 124 samples that were taken at Freeman Elementary School on Saturday, October 24, were analyzed by the DEQ Laboratory on Monday, October 26. The data is being compiled into a spreadsheet to allow an evaluation of the various sampling points. Initial indications are that there will need to be some replacement of plumbing fixtures, but issues do not seem to exist deeper into the plumbing infrastructure. Further sequential testing will be conducted at select points to verify that water is being drawn from the main.

- DEQ staff met to discuss lessons learned from the sampling event at Freeman Elementary School. A number of observations were made with respect to how to streamline the process. The group agreed to incorporate several of the observations into the sampling protocol. The protocol is being updated to reflect these changes.

Prepared by: George Krisztian, Flint Action Plan Coordinator
Laboratory Director
Department of Environmental Quality
Telephone: 517-284-6719
Cell: PPI
October 27, 2015

NAME

DATE

OCTOBER 5, 2015

PAGE NO. 1

PROJECT ACTION NOTES

517
243
1301

JEN ACTION PLANNER

PROJECT PLANNING NOTES

HANLEYF@MICHIGAN.GOV

SPECIFICATIONS FOR [redacted]

PITCHER-TYPE FILTRATION DEVICE

FOR HOMES W/ ATYPICAL FAUCETS

NEED BY 1:00 PM

* - MAKE UP DRAFT NOTE TO STAFF *

- LET CAROL KNOW THAT SUE WILL BE AT QUARTERLY MEETING

TOPS

NAME

DATE ASKS FOR WATER TO LOOK INTO. EST

3:30 PM MEETING 10/5/15

PAGE NO.

PROJECT ACTION NOTES

- BUDGET COST FOR TESTING
- FORENSICS?
- WHAT WOULD AN EXPOSURE ASSESSMENT PROGRAM LOOK LIKE

THEY WILL MEETING BEFORE 10 AM & THEN CONTACTING ME

PROJECT PLANNING NOTES

- READ AWWA DOCUMENT

- IMMEDIATE PRIORITY

MICHAEL SCHOCK
DARREN LYTLE
TOM SIZKE
} CORROSION CONTROL EXPERTS

WHAT EVALUATION IS NECESSARY TO DETERMINE FLINT VS DETROIT WATER BASED ON SCIENCE

THIS IS NOT JUST A LEAD ISSUE; AS THERE ARE OTHER CONSIDERATIONS

DO YOU HAVE AN OPINION WHICH IS BETTER?

WHAT DO WE NEED TO LOOK AT TO MAKE THAT DECISION?

A) HOW MUCH WILL COMPLETE TESTING COST

B) SUPPLY BOTTLED WATER

2 QUESTIONS FOREGORER TO ASK

JEN ACTION PLANNER

CTOPS

NAME

DATE

OCTOBER 6, 2015

~~PRE-MEETING~~

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

1 AT FLINT EPA MEETING 9:30 AM DAN

2 ~~PRE-MEETING~~ JIM LIANE GEORGE MIKE BZAID PAT COOK

3 SUSAN → REG 5 DIR

4 TINKA WD DIR REGS

5 TOM HYDE? BOARD · CINDY → HEAD OF CINCI LABS

6 PETER EPA DW

7 RED — TOM BURKE DET'S FLINT H2O *

8 EPA → NO OPINION; CAN SPEAK TO THINGS * THAT NEED TO BE CONSIDERED

9

10

11 DAN: FREE FILTERS & H2O TESTING TO RESIDENTS

12 ACCELERATING CORROSION CONTROLS

13 FLINT WILLING TO HELP SOURCE (BUT $ = ?)

14 STATE TO HELP

15 - LONG TERM REPLACING LEAD SERVICE LINES

16 - REVOLVING LOAN CAN THIS BE UTILIZED?

17 — — — — — — —

18 OPTION A = FLINT H2O + CORROSION CONTROL

19 OPTION B = DET H2O

20 DO NOT RUSH TO JUDGEMENT

21 EPA ⊃ BEST TO BE INFORMED BY DATA

22 THERE IS NO QUICK FIX

23 EVALUATE BOTH SOURCES

24

GEORGE = FLINT ACTION PLAN COORDINATOR

MAIN TOPIC

JEN ACTION PLANNER

TOPS

October 6, 2015

EPA Meeting Cont

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

THINGS THAT NEED TO BE

- GET CLEAR UNDERSTANDING OF
  - pH
  - Ca & Na
  - ALK
  - DISSOLVED INORGANIC CARBON
  - CHLORIDE
  - ~~[illegible]~~

- WHAT HAS ALREADY BEEN DONE IN TERMS OF TREATMENT

- IF YOU SWITCH BACK, WHAT SPECIAL STEPS NEED TO BE TAKEN

- REGARDLESS OF SOURCE SCALING WILL TAKE TIME (DC ADDED A LOT OF DETAIL)
  MAY NEED TO BOOST DIST H_2O

- HOW BIG A SHOCK WOULD THE CHANGE BE TO THE SYSTEM

NAME

DATE

October 6, 2015
Flint City Meeting

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

1) Review Action Items
2) Review Flints Concerns Lowest Area: Point 0
3) Communications
4) Corrosion Controls
5) Testing
6)
7)
8) Tech Advisory Committee Tomorrow 1st 2:00 PM
9)
10) Natashia Howard
11)
12)
13) Switch could be done in Reactively Quickly
14) up to 7 Days (Possibly 3-4)
15)
16)
17) George will be the DEQ Point of Contact for DEQ (POC)
18)
19)
20) Nick Lyons will Appoint DHHS POC
21)
22) - Set up weekly standing Meeting
23) - Natashia Henderson will be Flint POC
24)

Dr Alfred Franzblau
Prof Env Health Sciences U of M

JEN ACTION PLANNER

TOPS

NAME

DATE

Oct. 6, 2015

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

MAYOR:

NEED TO GET NOV & DEC DATES SQUARED AWAY

- THURSDAY 9:00 AM MEETING WITH MAYOR

NEED A CALL IN #

@ SIGNIFICANT DATES

- AUG 17TH DEQ → FLINT LETTER ADD COR. CONTROL MEASURES
  AND 5 JANUARY & FLINT STARTED IMMEDIATELY
- EARLY SEPT EDWARDS STUDY
- SEPT 24TH NURSEY BLOOD LEVELS
- OCT 2ND PRESS CONF

JEN ACTION PLANNER

©TOPS

NAME

DATE

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

15 ~~Million~~ Gallons per Day (per Month)

~~@~~ 1.3 Million per mo

9 × 1.3 = 11.7 million (for 9 months)

Energy Capex Cost of 28 mc/month

City cannot commit to more than 2

- Want collect all data & send it all out together
- Putting together follow up protocols together
- We plan to have all of together by end of ~~of~~ ~~ox~~

JEN ACTION PLANNER

TOPS

NAME

DATE

OCTOBER 6, 2015

2:00 PM MEETING DR WELLS

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

LINDA DYKEMA — JIM
JENNIFER GREY — DAN
LILY JINDEL — GEORGE
DR. WELLS — PAT COOK
MIKE BERSBY
HANS SPECHER
RICHARD BENZIE
STEVE BUSH
KAREN (CONSULTANT)

- RESULTS
- FOLLOW UP WITH A PROTOCOL
- RISK COMMUNICATION STRATEGY

- PROTOCOL
- RESPONSE
- WHAT SHOULD SCHOOLS DO?
- ACTION TEAM

- PROTOCOL
- STARTING WITH BASE DOCUMENTS

LINDA DYKEMA → BRING TOXICOLOGISTS FOR HELP WITH DECISION TREE

THURSDAY AM → DRAFT PROTOCOL READY
DISCUSS

JEN ACTION PLANNER

©TOPS

NAME	
DATE	

October 7, 2015
8:00 AM Meeting

PAGE NO.

PROJECT ACTION NOTES

JEN ACTION PLANNER

PROJECT PLANNING NOTES

Nancy - Budget
Mike
Rich
Nick Lyon

- The Deal
- Opportunity to flip the switch would take ~ 1 wk - 1½ wk
EPA no opinion but here's the criteria... lead to det is better
Flint financially better for Bill Collection

1.3 million per month additional cost
State 50%
Local 50% (where will this come from?)

This takes through 9 months to KWA going live

Short Term - Reducing Lead Exposure
Testing, Bottled Water... etc
Long Term - Revolving loan fund to allow replacing service lines
Middle Term - 3-6 months of corrosion control

©TOPS

NAME

JOB

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

DEQ TO ADD 10 STAFF FOR

- INITIAL RESULTS ARE JUST A SCREENING

- WILL DO FOLLOW UP DETAILED TESTING, NEED TO EVALUATE THE SCHOOLS ENTIRE PLUMBING SYSTEM

DAN RECOMMENDING WE MAKE AT DEQ WE COMMIT TO 50% NEED TO DO THIS BY THURSDAY

1 MILLION FILTERS ETC

6 BOW WATER

1 1/2 ~~RED~~ 10 FTE'S

8.5 MILLION TOTAL

DOWNSIDE RISK: FLIP SWITCH & LEAD IS THERE RUN OUT FILTERS

RISK #5 OTHER CITYS WANTING HELP TOO.

RISK #2 STILL HAVE TURBITY ETC ISSUES

RISK #5 WHAT IF NEED EXCEEDS 1.3 MIL

#4 SPRINGWATER PIPE DELAYED

UPS

NAME

DATE

October 7, 2015

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

9:00 - 9:45 WALK THROUGH

10:00 - 10:30 PRESS RELEASE CONF

ELDERLY CARE FACILITIES TO BE DONE AFTER SCHOOLS

9:00 - 9:45 → MEETING WITH MAYOR LOCATION TBD

9:45 - 10 PRE BRIEF

10:00 - 10:30 PRESS CONFERENCE

11:00 AM MEETING

- NEED TO RELEASE SCHOOL & INDIVIDUAL DATA

- GEORGE NEEDS TO BE ABLE TO SPEAK TO THE DATA

- FILTERS
- STATE'S PORTION OF WATER BILL
- RESOURCES HUMAN NOT "BOOTS ON THE GROUND"

JEN ACTION PLANNER

TOPS

NAME

DATE

PAGE NO

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

GOV WANTS A DESCRIPTION OF OUR PLAN

REMEDIATION IS NOT THE STATES RESPONSIBILITY

THIS IS A LOCAL ISSUE RESPONSIBILITY

OUR JOB IS TO IDENTIFY THE ISSUE & ENSURE THAT KIDS ARE PROTECTED FROM LEAD EXPOSURE

SCHOOLS ARE RESPONSIBLE FOR TESTING THEIR WATER

IF YOU ARE PUBLIC SCHOOL
PUBLIC WATER → NOT TESTED
OWN WELL → TESTING

LEAD & COPPER RULE REQUIRES SAMPLING AT TIER I POINTS (HOMES)
SCHOOLS AR TIER II & ARE ONLY TESTED IF THERE ARE NOT ENOUGH ADDRESSES FOR THE SAMPLING POOL

JEN ACTION PLANNER

TOPS

NAME

DATE

October 7, 2015

PAGE NO.

PROJECT ACTION NOTES

Let's use 15 PPB for now until we are told differently

1) What Did We Find?
2) What Does Data Mean?
3) What is Your Protocol?
4) How Do Schools Respond?

JEN ACTION PLANNER

* Sequential

PROJECT PLANNING NOTES

11:00 AM Meeting

High Level
- Communicating School Data
- W

What Did We Find?
Where Were Samples Taken
How Many
What Does it Say
Where Do We Go From Here
Protocol →

What Do Schools Do in the Meantime?

What is Data
What Does it Represent
W

9:00 Tomorrow
Mayor Meets with Matt & Gov

Testing is the Key for Health Protection

NAME

DATE

OCTOBER 7, 2015
5:00 PM

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

9-9:45 CON & MAYOR MEET

9:45-10:00 PRE-BRIEF

EVERYONE HAS 4 MINUTES FOR REMARKS

10 MINUTE BREAK FROM PODIUM

DIRECTORS STAY & DO INTERVIEWS

ADVISORY TO BE SENT OUT TONIGHT

EVENT WILL BE LIVE STREAMED

SMALL INVITE LIST

- CM
- PASTOR - PASTOR
- PASTOR
- ANABACM
- JAMIE GASTON

JEN MOTION PLANNER

TOPS

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DATE

OCTOBER 7, 2015 5:00 PM

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

AMMANCH, PARKS & NEARLY INVITED

DAN WILL SPEAK ON OVERVIEW NEXT STEPS & WHEN

MATERIALS

- TWO DOCUMENTS

JEN ACTION PLANNER

TOPS

NAME

DATE

OCTOBER 8, 2015

PAGE NO.

PROJECT ACTION NOTES

PHOSPHATE 460 mg/l DAY

DIARA

STOUT

WARD

LIANE

DHHS

GEORGE / MIKE KAREN, ERIC BRAD, PAT COOK LIANE

NEED #3 TO APPROVE #3

MICHIGAN.GOV/FLINTWATER

JEN ACTION PLANNER

PROJECT PLANNING NOTES

— 25 ACTION STEPS FOR NEXT WEEK

1) IDENTIFY SCHOOLS & PRIORITIZE FOR ASSESSMENT
2) GET DIARA PLUMBERS ORGANIZED
3) COMPLETE SAMPLING INSTRUCTIONS
4) MDARD INFO FOR RESTAURANTS
5) UPDATE 2004 LETTER TO EPA
6) APPROVE FLINT PLAN FOR WATER LINE
7) LEAD EDUCATION PLAN FOR SCHOOLS FOR DW
8) BEGIN REGULAR MEETINGS
9) SCHEDULE WTP TOUR
10) MEET WITH SCHOOLS & DIARA INVITATION ONLY
11) UPDATE WEB-PAGE
12) CONTACT DHHS TO SEE WHERE THEY ARE WITH UNIFIED WAY
13) CIRCULATE PROTOCOL DRAFT WITH EPA
14) CONTACT CITY ABOUT HOMEOWNER SAMPLE DELIVERY
15) COMMUNICATE TO MDARD & CITY THAT BUSINESS SAMPLES SHOULD BE COORDINATED THROUGH LAB
16) FIGURE OUT # OF SAMPLES FROM SCHOOLS & CHILD CARE FACILITIES
17) CONFIRM DYKEMA IS POC FOR DHHS
18) CONTACT KWA TO FIND OUT IF THERE ARE ANY BOTTLENECKS WE NEED TO REMOVE

NAME

DATE

PAGE NO.

PROJECT ACTION NOTES

OPTIMIZE

JEN ACTION PLANNER

PROJECT PLANNING NOTES

(& PRELIMINATE PLAN)

19) EXPEDITE 319 PERMIT (MIKE P.)

20) GET UPDATE ON INDEX CARD CONVERSION SERVICE LINE

21) IDENTIFY WHERE PARTIAL REPLACEMENTS EXIST

22) MAKE SURE DHHS GETS INFO SO THEY CAN CROSS REF.

23) LEGISLATIVE CONTACTS

24) LEGISLATIVE TIME LINE & SUMMARY

25) DAN RECONNECTS WITH STATE SUPERINTENDENT'S

26) CONDUCT AFTER ACTION PLAN

27) CHANGE PAGE 54 → DWRLF

TOPS

NAME

BY Lc

October 9, 2015

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

QUESTIONS FOR LANE

- DO WE HAVE ANY STATUTORY AUTHORITY TO HAVE SUPPLIES PROVIDE ADDITIONAL SAMPLES (FROM SCHOOLS) FOR L&C TESTING?

FRANK BALCER 7TH FLOOR

CONFERENCE CALL TO IDENTIFY FACILITIES FOR ASSESSMENT

LYNDA DEKAMA (DHHS) STEVE BUSCH

LANE GEORGE

HOWARD CROFT (FLINT)

HOWARD
- SCHOOL LUNCH CENTRAL DATA TODAY

JEN ACTION PLANNER

TOPS

NAME

DATE

OCTOBER 9, 2015

MEETING RE: LAB STAFFING

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

- NOTES FOR SUE LEEMING
- MOOD AT LAB APPEARS TO HAVE TAKEN A DRAMATIC DOWN TURN
- STAFF SEEM TO HAVE FORGOTTEN EVERYTHING I SAID ABOUT NEW HIRES
- NEED TO DO SOME CHEERLEADING
- NEED TO PROVIDE ASSURANCES ON RESOURCES
- THE GROUP OF "WE WERE JUST ~~THERE~~ TALKING" NEEDS TO BE ASSIGNED THE TASK OF NOT COMING UP WITH A SUPPLEMENTAL SEASONAL STAFFING PLAN THAT IS COST NEUTRAL. ~~THEY SHOULD BE GUILTY~~
- HISTORY OF DW STUFF
  - COMPLAINT THAT I DON'T SPEND ENOUGH TIME GETTING WORK FOR DW

JEN ACTION PLANNER

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NAME

DATE

OCTOBER 12, 2015 — LOOK AT FREE PRESS ARTICLE

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

25 - FLINT IN PROCESS OF PRIORITIZING SCHOOLS
26 SHOULD HAVE LIST BY COB TUESDAY
27 - FLINT SENDING OUT 3RD QUARTER REPORTS
28 INCORPORATING INPUT FROM TAC
29 - TRYING TO SET UP WEEKLY MEETINGS
30 WITH APC'S FROM 3 DEPTS DAHS, DEQ, LARA
31 - DEQ SETTING UP WEEKLY MEETING WITH MAYOR
32 DAHS & LARA WISH TO BE INCLUDED
33 - DEQ SETTING UP TOUR OF WTP, MCLUSON?
34 - INITIAL AFTER ACTION PLAN MEETING
35 TO BE SCHEDULED THIS WEEK (THURSDAY?)
36 FRAMING ISSUES THAT WE NEED TO DEAL WITH
37 - DAILY REPORTS TO THE GOVERNOR
38
39 - DAILY REPORTS TO BY 8AM EACH
40 MORNING REPRESENTING THE PREVIOUS DAY
41
42
43 GEORGE TO SEND LIST TO LARA
44 ONCE IT HAS BEEN FINALIZED
45 - LINDA TO APPROVE/COMMENT ON PRIORITIZATION
46
47 - GET CONTRACT INFO FOR 3 PRIORITY SCHOOLS
48

FOLLOW UP WITH LIANE

GEORGE SHELLY & LINDA TO HAVE WEEKLY CONVERSATIONS

THIS IS FOR GOVS REPORT FOR TUESDAY AM

AGE & LOCATION (ZIP) WILL SET PRIORITY

JEN ACTION PLANNER

ICTOPS

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DATE

October 12, 2015

PAGE NO.

PROJECT ACTION NOTES

- Conv with Mark V GCHD
- GCHD to sample to add credibility to sampling

Q: How many still outstanding
A: At least 2 systems

Cheese

Highest value over last 6 yrs

Only 8 were municipalities

JEN ACTION PLANNER

PROJECT PLANNING NOTES

- Karen & Eric for WTP tour

- Maggie & Sara need info on Legislature Committee & duties about.

Community water
26 systems > 15 PPB Pb
since 2009

(The next question will be what about other systems?)

Data since 2009 (2x3yr samplings)
Plus what we have for 2015 so far

Community
1327 water systems.
26 have been over 15 ppb
286 5-15 PPB
1013 nothing over 5 PPB

Report quarterly to EPA

All 90th percentage exceedances

1)	Green Oak Centennial	2001	900	5) South Lyon	2013	15.5 PPB 11K Pop
2)	Hillman	2001	700	6) Allegan Co. Services		100
3)	U of Grosetown	2015	400	7) Muskegon Co.	2011	3800
4)	Ft Ave Parks	2010	170	8) Pierre Marquette Township Wells		10?

Plus the 2 currently over

CTOPS

NAME

ADD

October 12, 2015

SEN. Avanicd & Andy

PAGE NO

PROJECT ACTION NOTES

IDENTIFY FOCUS FOR — DEQ, DHHS, CARB

FOR UNDER

STAFFING

HOT LINE

REPLACEMENT FOR FILTERS

NEED TO GET TOLE FILTER ISSUE COORDINATED

WHAT RESOURCES WILL BE ALLOCATED TO COORDINATE THIS ?

ALL FILTER RELATED QUESTIONS

PROJECT PLANNING NOTES

FOUR CATAGORIES OF FOCUS

1) GO THROUGH HISTORY

2) GO THROUGH THE PLAN GOING FORWARD

3) WHAT DO WE NEED TO DO TO GET APPROP THROUGH

4) AFTER ACTION REVIEW

#3 APPROP ; SEN -> WERE SITTING IN A GOOD PLACE RIGHT NOW

MAGGIE : HEALTH ENDOWMENT FUNDS IS NOT A GOOD FUNDING SOURCE

PREFERRED CHOICE IS LAPSED FUNDING

IF VOTES ARE THERE THE MAGGIE MOVE IS TOMORROW

SEN TO FOLLOW UP WITH DEM SIDE

107 MEMBERS 46/61 D R REPUBS

NEED AT LEAST 8 IN HOUSE

GEORGE TO COPY SENATOR & ANDY NOTES ON WEEKLY MEETINGS WITH FLINT

HOW DO WE GET FILTER INSTALLED IN HOMES OF ELDERLY

JHN ACTION PLANNER

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OCTOBER 12, 2015

SUPERINTENDENT OF SCHOOLS FOR MICHIGAN

PROJECT ACTION NOTES

JEN ACTION PLANNER

PROJECT PLANNING NOTES

- DAN GIVING REVIEW OF ACTION PLAN

STATEWIDE WHAT DOES THIS MEAN?

CONTACT: KYLE GUERRANT
DEPUTY SCHOOLS

OVERVIEW OF SCHOOLS TESTING PROTOCOL
WE DO NOT HAVE RESOURCES FOR
THIS AT THIS

DAN'S SWIMMING FROM DETROIT TO FLINT RIVER
LED TO A COMPLICATED SITUATION
DETROIT OCCASSIONALLY HAS EXCEEDED BUT
THEY HAVE ALWAYS BEEN ABLE TO BRING IT BACK
INTO COMPLIANCE.

NEXT STEPS
GEORGE & LANE WORKING WITH
KYLE ON STATEWIDE EDUCATION PROGRAM
TO SCHOOLS & HOW TO IMPLEMENT THAT.

©TOPS

NAME

DATE

OCTOBER 13, 2015
COORDINATER'S MEETING 8:00AM

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

DEC STARTED CLEANUP

LINDA DYRAMA (DHHS) TOXICOLOGIST

SHELLY EDGERTON (LARA) CHIEF DEPUTY DIR

GEORGE KRISTIAN (DEQ) LAB DIRECTOR

SERVED 20 YRS COUNCIL 5 YRS

GEORGE TO ASK SUPERINTENDENT

CAN WE ASK TO HAVE A MAINT PERSON AVAILABLE WITH BLUEPRINTS ?

DHHS

INCLUDE EDEN FOR SURE & LINDA IF ROOM AVAILABLE

LARA

SHELLY & IRV POKE FROM LARA

LINDA

- DECISION TREE TO EVALUATE LEAD RESULTS AS IT COMES IN
- PRESENTED TREE TO STEERING GROUP & ASKED TO EVALUATE NUMBERS & COME TO CONCURRANCE FOLLOW UP TODAY TREE AVAILABLE END OF WEEK
- EVALUATED SAMPLING PLAN: NEED MORE DETAIL ON VARIOUS POINTS TO LANE

REQUEST FOR SAMPLING PLAN HAVE DATED COPY

GEORGE TO FOLLOW UP & GET A DATE

CAN MOVE FORWARD ON PLUMBING EVALUATION BUT SAMPLING NEEDS WORK

IEN ACTION PLANNER

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NAME

DATE

OCTOBER 13, 2015

PAGE NO.

PROJECT ACTION NOTES

- RCVD FOIA
- GOT EXTENSION
- REPLY 2 OF 3 DIVISIONS HAD NO INFO
- RESPONDED WITH 3 DOCS FROM DDWMA

- NEED TO DO AN OUTREACH TO REP PHELPS TO HELP DEFINE THE ASK

ALL FUTURE DOCS

JEN ACTION PLANNER

PROJECT PLANNING NOTES

SHELLY

WAITING FOR DIRECTION FROM SUPERINTENDANT

JUST NEED A GREEN LIGHT

11:15 AM FOIA REQUEST MEETING

DUE DATE SEPT 29

10 DAY EXTENSION WAS FILED

FOIA WENT TO KAREN

9/22 & 9/25 RECORDS DO NOT EXIST

THREE DOCUMENTS WERE PROVIDED BY DDWMA

- BASELINE CAPACITY → DEFG TO CCT
- DATA RE NEW WATER WITHDRAWAL & BASELINE CAPACITY
- TOTAL LOW SERVICE INTAKE MILLION GALLONS/DAY
PUMP CAPACITY DOC : 90 MGD

STOPS

NAME

DATE

OCTOBER 13, 2015

3:15 PM

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

WHY WERE SAMPLES EXCLUDED

ADAM: ~~2004~~ LETTER FROM EPA

RULES DEFINE WHERE SAMPLES CAN BE DRAWN

- MIN SEPARATION OF GWRS (NO MORE)

REASONS FOR EXCLUSION

- HOME HOUSE FILTERS
- BUISNESSES
- HOLD TIME FOR PRESERVATION

- SEND ICP/MS SOP TO LIANE *

JEM ACTION PLANNER

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OCTOBER 14, 2015
DEQ/DAG MEETING

PAGE NO.

PROJECT PLANNING NOTES

DAG
- POLLY
- BOB
- PETER

DEQ
- MADLY
- BRAD
- GEORGE

PH
JIM
MAGGIE

* MEETING WITH COUNCIL NOT SUBJECT TO FOIA *

- POLLY SAPPI

7 PALE POLYGNAME (MORSE SETTLEMENT ISK)

OCTOBER 15, 2015

MEETING WITH DIRECTER
EGLE
WURFEL
GEORGE
LANE

248 721-
1301
JESSICA ABC
COUNTY
JAIL

NEWS

RESULTS FOR GENESSEE COUNTY JAIL

- INITIAL SET OF 5
- ~~CH BACK AS~~
- 2 ND
- ~~1 PPB~~
- 1 2 PPB
- 1 168 PPB

FOLLOW UP TESTING WAS DONE AND THAT SAMPLE CAME BACK A 7 PPB

BASED ON THAT GCHD ISSUED A STATEMENT THAT THE WATER AT THE GC JAIL

STOPS

JEN ACTION PLANNER

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October 15, 2015

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PROJECT ACTION NOTES

PROJECT PLANNING NOTES

JESSICA ABC NEWS

248 721 1301

RESULTS FOR GENESEE CO JAIL

5 SAMPLES WERE INITIALLY TAKEN

2 — NOT DETECTED

1 — 1 PPB

1 — 2 PPB

1 — 168 PPB

THE SAMPLE AT 168 PPB WAS TAKEN AT A FAUCET IN SINK IN THE MEDICAL DEPT

~~SUBSEQUENT EXAMINATION SHOWED~~ THAT THE AERATOR CONTAINED SIGNIFICAT DEBRIS THE AERATOR WAS CLEANED AND A FOLLOW UP SAMPLE TAKEN

RESULTS WERE 7 PPB

BASED ON THAT THE GCHD PROVIDED A STATEMENT THAT THE WATER AT THE JAIL WAS IN COMPLIANCE MET THE EPA SAFE DRINKING WATER STANDARD

JEN ACTION PLANNER

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OCTOBER 16, 2015
CITY OF FLINT 10:00 AM

PROJECT ACTION NOTES

- SEND SPREAD SHEET OUT TO GROUP FOR SAMPLES ANALYZED SO FAR

- ✓MAYOR
- NATASHA
- LINDA
- SHELLY
- HOWARD
- KAREN

PROJECT PLANNING NOTES

1. - INTRODUCTIONS
2.
3. - ACTION ITEMS COMPLETED
4.
5. - DISCUSSION OF SAMPLING PROTOCOL
   SEE NEXT PAGE
6.
7. LINDA DYKEMA
8. DHHS RETESTING CHILDREN
9. WITH ELEVATED BLOOD LEAD LEVELS
10. WILL USE A MULTI PATH
11. EXPOSURE EXAMINATION LOOKING
12. AT SOIL AIR WATER ETC
13. WATER SAMPLING WILL BE DONE
14. IN SIMILAR FASHION AS THE
15. SCHOOL SAMPLING
16. LEAD PAINT FAR MORE * *
17. CRITICAL TIME DID EXPOSURE
18.
19. EDEN WELLS
20. IDENTIFY CHILDREN IN 5 SCHOOLS
21. FIRST
22.
23.
24.

JEN ACTION PLANNER

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PROJECT ACTION NOTES

PROJECT PLANNING NOTES

HOME OWNER PROTOCOL

DO WE MAINTAIN OR CHANGE?

GEORGE TO DISCUSS WITH DAN

BRING IN EDWARDS INTO DISCUSSION

- CREATE SAMPLING PROTOCOL WORKGROUP

- GEORGE - MARK JOHNSON
- LINDA - CHRIS FLAGA FERIC
- SHELLY - 5460
- DIZ WELLS - JIM HENRY GOULD
- NATASHA - CONTACT EPA EXTEND INVITE
- HOWARD -

SEND OUT INITAL E-MAIL TO TRIC COORDINATION GROUP.

INVITE JIM

JEN ACTION PLANNER

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OCTOBER 16, 2015
FLINT SUPERINTENDENT'S MEETING

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

BILAL TUWAB SUPERINTENDENT

TONY SITKO → CENTRAL CONTACT CC: SUPER THIS WILL GO ON TO PRINCIPALS

SHELLY EDGER

KAREN

LINDA

RACHAL TURNER PRINCIPAL

BLOOD TESTING OF CHILDREN AT SCHOOLS?

TENTATIVE PLUMBING INSPECTION NEXT WEDNESDAY

DATA NOT FOR PUBLIC DISTRIBUTION UNTIL IT CAN BE PROPERLY EVALUATED

JEN ACTION PLANNER

STOPS

NAME

DATE

OCTOBER 16, 2015
GCHD 2:30 PM

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

25 JIM CELL: 517 404 8401
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48

ACTION PLANNER

©TOPS

NAME

DATE

OCTOBER 19, 2015
8:00 AM EXEC MEETING

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES:

1 * - SEND DAN UPDATE ON BAY CO.Y *
2
3
4 BILL CREDLE
5 - RAM RETREAT IMPLEMENT HDX
6
7 - IRA SUE LEEMING
8 CONFERENCES WERE WILDLY SUCCESSFUL
9 THANKS TO DEA FOR ASSISTANCE
10
11 - BICYCLE BOARD
12
13 - JACK DEA
14 - MEDICAL DISCUSSION
15 SUSAN → FOIA TRAINING
16
17 PAUL → AMES GROUP?
18
19 MIKE → LIQUID INDUSTRIAL WASTE BILLS
20 GROUND WATER FEES BOARD ESTABLISHED
21
22 BRAD - DOWA?
23
24 TOM AYER →

JEN ACTION PLANNER

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NAME

DEPT.

OCTOBER 19, 2015 8:30

STAT MEETING

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

* NEED TO CANCEL RESERVATION FOR MANAGERS MEETING

RE: SP2

TOM KLAUSERANTO:

FOIA PRESENTATION

WITHIN 45 DAYS OF BEING CHARGE THE FEE CAN BE DISPUTED DURING THIS TIME THE FOIA DOES NOT NEED TO BE PROCESSED.

FRANK COMMUNICATIONS EXEMPTION 13.1

DELIBERATIVE: OPINIONS CAN BE EXEMPT

THE JUDGE HAS THE RIGHT TO REVIEW THESE PROCEEDINGS TO DETERMINE IF DOCUMENTS MET CRITERIA.

PRIVACY EXEMPTION

SETTLEMENT ~~DISCUSSIONS~~ NEGOTIATIONS ARE ALSO EXEMPT

INTERACTION PLANNER

TOPS

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DATE	

October 19, 2015
SOG MEETING CONTINUED

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

FOIA REQUESTS MUST BE MAINTAINED FOR A MINIMUM OF 1 YEAR.

USE THE PHRASE "IT IS MY OPINION THAT" * THIS HELPS TO DEMONSTRATE THE DELIBERATIVE PROCESS.

EMPLOYEE SHOULD USE A HIGHLIGHTER FOR HELPING TO DEFINE REDACTED PORTIONS NEED TO KEEP A CLEAN COPY FOR JUDGE

1) CREATE RECORDS INTELLIGENTLY
2) FOIA IS AN IMPORTANT PART OF THE 1ST AMENDMENT
3) DON'T HESITATE TO CALL THE LAWYERS

JEN ACTION PLANNER

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OCTOBER 19, 2015

MEETING WITH DR. EDWARDS

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

DR. EDWARDS

ANDY FROM SEW ANADICH

AGENDA

1) REACH & RECOGNIZE DR. EDWARDS
2) AFTER ACTION REVIEW
3) LCR NEEDS REVIEW

- WHAT DOES THE DEC NEED TO DO
- MOVING FORWARD NEED TO EVALUATE THE LCR & HOW WE CAN CHANGE IT

DR. EDWARDS:

- 2015 SAMPLING DID NOT MEET THE REQUIREMENTS OF THE LCR

FLINT FOUND YEARS OF SAMPLING

BY

~~[illegible]~~ BUSCH } DR EDWARDS HAS ISSUES
- SARGENT SIXTH } & WITH

JEN ACTION PLANNER

©TOPS

NAME

DATE

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

* NEED TO READ 2CR *

- UNDER WHAT CONDITIONS ARE DATA EXCLUDED?

- DID EPA INSTRUCT DEQ STAFF TO NOT EXCLUDE THE DATA POINT THAT WAS EXCLUDED?

JEN ACTION PLANNER

TOPS

NAME

DATE

OCTOBER 19, 2015
3:00 PM

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

SYED
LANE
PAT
MIKE
STEVE
GEORGE

GEORGE TO CALL HOWARD
ABOUT WATER COMPLAINTS

CALL SHELLY
GENESEE CO

JEN ACTION PLANNER

TOPS

NAME

DATE

October 20, 2015

8:00 AM

PAGE NO.

PROJECT ACTION NOTES

FOR LINDA,

829
E Wellington
AVE
48503

DATA DOES NOT EXIST.

* BOTTLE KITS TO WHOEVER IS SAMPLING *

JEN ACTION PLANNER

PROJECT ACTION NOTES

1 - CALL JIM AT GCHD ABOUT TREE SAMPLING

2

3 ANSWER -> NO

4

5

6

7

8

9

10 9:30 AM @ MEETING WITH LARA

11

12 - DRAFT PROTOCOL FOR SAMPLING

13

14 STEVE TO GO ON WEDNESDAY

15 TO OBSERVE PLUMBING EVALUATION

16

17 - NAMING CONVENTION FOR LABELING

18 AS SPECIFIED IN DOCUMENT IS OK

19

20

21 * GEORGE TO CALL JIM *

22 AT GCHD

23

24 FREEMAN TO GO FIRST

TOPS

NAME

DATE

ACTION ITEMS

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

* LIANE & GEORGE TO CALL LAB AFTER MEETING *

* GEORGE TO CALL JIM AT GCHD *

* BOTTLE KITS NEED TO BE PUT TOGETHER *

JEN ACTION PLANNER

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PROJECT ACTION NOTES

JEN ACTION PLANNER

OCTOBER 20, 2015 — PAGE NO.

EPA CONFERENCE CALL @ 1:30 PM

PROJECT PLANNING NOTES

SUSAN HEDMAN

BOB CHAPLIN CHAIR OF EPA TASKFORCE

TASK FORCE

ONE STOP SHOPPING TECHNICAL

ASSISTANCE FOR @ OPTIMIZATION OF

SWITCH TO DETROIT & KWA

WANT TO PROVIDE ASSISTANCE

PRIOR TO DECISIONS BEING MADE

TOPS

TIME

DATE

PROJECT ACTION NOTES

OCTOBER 21, 2015 — PAGE NO.

1:00 PM FLINT DELEGATION

PROJECT PLANNING NOTES

25 DAVID BULLOCK — JIM, DAN, GEORGE

26 ERIC POST DAT

27 SHEERIE JACKSON

28 SHARONDA WILLIAMS

29 PASTOR

30 KARY KOSEL DAT

31 TYRONE ALLEN

32 LAURIE

33 LEE JACOBS

34 BARBARA

35 ALMA KOZART

36 JUDGE AUSTIN

37

38 DAN

39 - DIRECTOR SYS

40 - STARTS WITH DECISION TO GO TO KWA

41 - THEN DISCUSSION OF CONTRACT BETWEEN FLINT & DETROIT

42

43

44

45

46

47

48

NEW ACTION PLANNER

TOPS

NAME

DATE

OCTOBER 22, 2015
1:00 PM

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

INITIAL INTERNAL
AFTER ACTION REVIEW

DISCUSSION OF ROLES

JIM → INTERIM CHIEF ODMA
MAGGIE → LEGISLATURE
BRAD & KAREN → MEDIA
GEORGE → ALL THINGS FLINT
MADHAV → STAFFING EXTERNAL AFTER ACTION REVIEW
STEVE HOW TO WE HANDLE REGULAR WORKLOAD?

DIAN WE NEED TO FOCUS ON MOVING FORWARD
& MOVE THE STORY TO WRAP THE FUTURE

- IMMEDIATE NEED FOR INTERNAL AFTER ACTION REPORT
- OVERVIEW SUMMARY TIME LINE THAT TELLS THE STORY

OUTLINE IS CRITICAL *

JEN ACTION PLANNER

STOPS

PROJECT ACTION NOTES

PAGE NO.

PROJECT PLANNING NOTES

4 THINGS THAT WE NEED

1) AFTER ACTION REVIEW SUMMARY (LANE)
UP TO 20 POINT PLAN

2) DID WE MAKE A MISTAKE?
IF SO WHAT WAS IT?

3) LESSONS LEARNED
WHAT CAN WE DO DIFFERENTLY/BETTER?

4)

IMPLEMENT 10 POINT PLAN

5 GO TO WORK WITH LABORER (PETER HARRISON)



JRN ACTION PLANNER

©TOPS

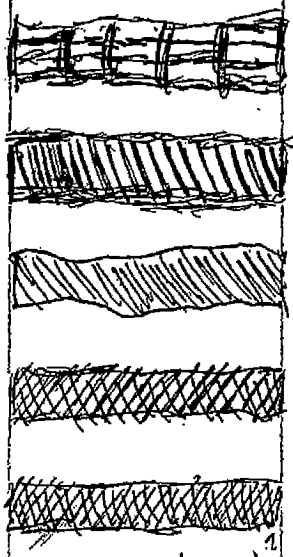
NAME

DATE

OCTOBER 23, 2015
10:00 AM FLINT

PAGE NO.

PROJECT ACTION NOTES



PROJECT ~~PLANNING~~ NOTES

- SEND HOWARD & THE ENTIRE GROUP THE PRIORITIZATION OF THE ORIGINAL 13 SCHOOLS

3.3 mg/dL CAPILLARY TEST

SINCE APRIL 13

FINGER POKE

PRIORITY I (71 CHILDREN ELEVATED CAPILLARY
26 ELEVATED VENUS FULL BLOOD DRAW

SINCE OCTOBER 2015 AS WELL

- GO TO PROVIDER
- GO TO HD

PRIORITY II

FIREMAN BRIDGE (3 SCHOOLS)
ALL OTHER YOUNG CHILDREN (0-6 YRS)

PRIORITY III

ALL OTHER CHILDREN

PRIORITY 1 WOMEN PREGNANT HEALTH CARE PROVIDERS SENSITIVITY OF CAPILLARY TEST?

USE 4754

4500 N DORT

N 3 miles UP SEWART AVE EXIT

JEN ACTION PLANNER

TOPS

PAGE NO.

OCTOBER 23, 2015

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

25 ~~DOCTOR~~ 7:45 AM DUNHAMS
26 PICK UP TRACY JO
27 * 1997 OLDS SEDAN GOLD *
28
29 JEANS DECENT SHIRT NOTHING FANCY
30
31 4001 OGEMA AVE
32
33 FLINT 48507
34
35 FREEMAN ELEMENTARY
36
37 EXIT 98 OFF 69
38
39 WOODBURY PARK & RIDE
40
41 LOTS 989 ~~400~~ 640 8603
42
43
44 ~~9~~ 9:00 AM -> SCHOOL
45
46
47
48

I-69
MSU
DEPT
EXIT

FOR
SCHOOL

DAY-TIMER ACTION PLANNER

©TOPS

NAME

DATE

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

4 SAMPLES

FD 1 > DO NOT SHUT OFF IN BETWEEN

TURN OFF FD 2

30 SECOND FLUSH

SAMPLE 3

TURN OFF 2 MINUTE FLUSH

SAMPLE 4

OBSERVATIONS ON SAMPLING

(2-3 SETS OF 10 L LITER SAMPLES)

~~- 5TH SAMPLE 2-3 MIN MORE FLUSH~~

- NUMBER BOTTLE TOPS (1,2,3,4,5)

- FINE POINT SHARPIES FOR LABELING

2 TEAMS OF 3

- DATA HOLDS ON THE 1ST 3 SCHOOLS

- GEORGE CREATES SPREAD SHEET

— WATER STAFF 1ST

— LARA & HHS 2ND

— SUPERINTENDENT 3RD

— THEN REPORT

JEN ACTION PLANNER

©TOPS

NAME

DATE

OCTOBER 27, 2015

PAGE NO.

PROJECT ACTION NOTES

NUTRITIONS
FOODS HIGH IN
- CALCIUM
- IRON
- VITAMIN C



JEN ACTION PLANNER

PROJECT PLANNING NOTES

- REVIEW 10 POINT PLAN — LINDA, MICHELLE, KORY, STEVE, GEORGE, LIANNE

- NEED TO MEET WITH 10 SCHOOLS

~~3:30 PM AUDITOR GENERAL'S MTNG~~

OCTOBER 28, 2015
MEETING WITH DHHS TO DISCUSS SAMPLE RESULTS

SUE MORAN
KAREN T
EDEN WELLS
} ON PHONE

NICK

LINDA

SINCE 9/29/15
572 TESTED
6 CONFIRMED CASES OF ELEVATED LEVELS
5-44
NONE OVER 45 MCG/DL

NAME:

DATE:

PAGE NO.

PROJECT/ACTION NOTES

PROJECT/PLANNING NOTES

10/28/15
1:30 PM
EPA CONFERENCE CALL

10/29/15 (INTERNAL)
11:00 AM AFTER ACTION PLAN MEETING

10/30/15
FRIDAY FLINT MEETING

- MET W EPA EDUCAT COMMENTS
- 3 SET OF 10 SEQUENTIALS TO BE ADDED
- DATA CONSISTENT BUT NEED SEQUENTIALS FOR FULL PICTURE
- BROWNELL & EISENHOWER THIS WEEKEND

* MONDAY NOVEMBER 9TH * BLOOD DATA AVAILABLE

* 27 MG/L * PHOSPHATE MAY DOSE FOR INFANTS

* SEND OUT PRIORITY OF * SCHOOLS TO FLINT GROUP

JEA ACTION PLANNER

G.TOPS

NAME

DATE

PAGE NO.

PROJECT ACTION NOTES

- GET WITH MARY BETH FOR SCHEDULING ME FOR MONDAY AM MEETINGS

1) SY GO TALKS

2)

3) E-MAIL TIME LINE REQUEST FOR COC CONTROL

4) PLAN TO SPEAK WITH EDWARDS

5) GEORGE PACKAGING LAB DATA

JEN ACTION PLANNER

NOVEMBER PROJECT PLAN 2015 SITES 9:35 AM

ISSUES TO PREPARE FOR

FONGERS → DID FLINT APPROPRIATELY ~~SUBMIT~~ SUBMITS SAMPLES

- FLINT CERTIFIED SAMPLES AS TIER 1
- EDWARDS/FONGERS CLAIMS THEY ARE NOT
  - LOCALLY THEY COULD HAVE SUBMITTED SAMPLES DIDN'T QUALIFY
  - HOW ARE WE RESPONDING?
    * ASK CITY TO VERIFY *
    NEED TO BE LATER TOGETHER TO REQUEST VERIFICATION

1) WHY WAS TEST RESULT DISCARDED?

2) DID WE VALIDATE SAMPLING PLAN

3) WHY WAS # OF SITES LOWERED

~~[illegible]~~

STOPS

NAME

DATE

11/2/15

PAGE NO.

PROJECT ACTION NOTES

* GEORGE TO ASK STAFF FOR SAMPLING VOLUNTEERS *

JEN ACTION PLANNER

PROJECT PLANNING NOTES

ISSUES WITH Pb/Cu SAMPLING FROM 10/31/15

- BOTTLE SAYS ONE THING PAPER WORK SAYS ANOTHER

- 1 LITERS DID NOT HAVE INFO ON BOTTLES

- NEED TO √ THE TEST CODE BOX

- BROWNELL 1 LITERS ~~ARE~~ ARE COMPLETELY OUT OF ORDER

- ~~EISENHOWER~~ EISENHOWER 1 LITERS ARE 1-10 BUT NOT A-1-10, ~~B~~ B-1-10 SITE

STOPS

NOVEMBER 3, 2015
8:00 AM

PAGE NO

PROJECT ACTION NOTES

GEORGE
SHELLY
LINDA

PROJECT PLANNING NOTES

WEEKLY ACTION PLAN COORDINATOR'S MEETING

- SAMPLED BROWNELL & EISENHOWER ON SAT
  374 SAMPLES TAKEN IN TOTAL

- PUTTING TOGETHER REPORT FOR FREEMAN

- WILL BE DOING 2 MORE ELEMENTARY SCHOOLS THIS WEEKEND
  - 1 LARGE 3 STORY 1 SMALL
  - TEAM DOING SMALL WILL CIRCLE BACK TO HELP

- JOE & ANDY DOING A GREAT JOB!

JEM ACTION PLANNER

TOPS

TOPS

NAME

DATE

PROJECT ACTION NOTES

JEN ACTION PLANNER

NOVEMBER 4, 2015
10:00 AM AFTER ACTION MEETING

PAGE NO.

PROJECT PLANNING NOTES

- STATUS UPDATE ON TIMELINE ?

- FREEMAN SEQUENTIALS DUE TODAY

- HOW DO WE ROLL OUT RESULTS
- GCHD FOIA

1) DOH TO COMPLETE TIMELINE
2) MEET WITH DHHS RE BLOOD DATA
3)

MESSAGE NEED TO USE
ALL THREE OPTIONS

1) KEEP OUT OF USE
2) FLUSH
3) REPLACE

©TOPS

NAME

NOVEMBER 4, 2015
3:00 PM MEETING WITH DHHS

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

Sue Moran Phone
Nick on Phone

AGENDA

- RELEASE OF SCHOOL DATA
- RELEASE INDIVIDUAL DATA
- BLOOD LEAD LEVELS
- NEW DEVELOPMENTS

* BLOOD LEAD TESTING *

4/14 - 9/15

OF CHILDREN TESTED

ALL 0-6 4714
2424 ≥5
5.1% POSITIVITY RATE

LAST MONTH
385
12
3.1% POSITIVITY RATE

JEN ACTION PLANNER

TOPS

TOPS

NAME

DATE

NOVEMBER 5, 2015
11:00 AM MEETING WITH DHHS

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

- MESSAGING WITH RESPECT TO LEAD NUMBERS
- HOME SAMPLING PROTOCOL TO BE FINALIZED

3:00 PM INTERNAL AFTER ACTION REVIEW

WHY DROP SAMPLING POOL SIZE?
WHY WERE SAMPLES EXCLUDED?

WHY DIDN'T YOU VARY CITY SAMPLING SITES?

DAN SPOKE WITH MARC EDWARDS 11/5/15

JEN ACTION PLANNER

LITOPS

NAME

PAGE NO.

NOVEMBER 6, 2015
10:00 AM: FLINT COORDINATOR MEETING

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

- DWSD WATER HAS REACHED THE ENTIRE SYSTEM
- ~$50K FOR phosphate supplemental addition PUMPS ETC.

Estimate 30 DAYS TO COME ON LINE

~~13,400~~ filters DISTRIBUTED 13,649 PER EDEN

INFORMATION PLANNER

CTOPS

CTOPS

NAME

DATE

NOVEMBER 6, 2015
3:30 PM

PAGE NO. 1

PROJECT ACTION NOTES

TIMESHEET !!

PROJECT PLANNING NOTES

- WEAR BLUE SHIRT
- TIES (NO SMALL PATTERNS)

56 POINTS DOYLE - RIDER

1040 NORTH SAGINAW ST.

PIERCE ELEMENTARY
923 E. KEARSLEY ST.
34 POINTS

JEN ACTION PLANNER

TOPS

NAME

DATE

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

25
26
27
28
29
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31
32
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35
36
37
38
39 ISSUES
40 – WHY DID STEVE BOZARTH INDICATE FLINT HAD AN OPTIMIZED SYSTEM
41
42 – AMBIGUOUS ROLE
43
44 – NEED TO VERIFY FLINTS SAMPLING DATA
45
46
47
48

JOB / ACTION PLANNER

©TOPS

NAME

DATE

November 8, 2015

PAGE NO.

PROJECT ACTION NOTES

Plan to Review COVS Update
- Key Actions
- Positions
- Concerns

JEN ACTION PLANNER

PROJECT PLANNING NOTES

Talking Points: Lead Testing Data

Freeman Elementary

- A Comprehensive Evaluation of the Plumbing System of Freeman Elementary was conducted by the DEQ & DHHS.

- Samples were taken at a total of 31 faucets & drinking fountains were

- Nine of these fixtures were found to have lead levels exceeding 15 PPB

- Call Natasha this morning after COV's letter.

CTOPS

NAME

DATE

PAGE NO.

TUESDAY NOVEMBER 10, 2015

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

INTERVIEW ROCHELLE RILEY

- 90 MILLION FOR REPLACING DISTRIBUTION SYSTEM
- LEAD EDUCATION PROGRAM
- ENDOWMENT FOR AFFECTED CHILDREN

→ REP WEEKLY:

DAN

SHORT - FILTERS ETC

MED - CORROSION CONTROL

LONG - REPLACING LEAD SERVICE LINES

PERM PLANS

- CC EXPERTISE REINFORCEMENT IN DEPT
- LOOKING TO DEVELOP PROTOCOLS
- MAJOR CITIES ARE IN COMPLIANCE
  - VA

HOW MANY SUPPLIES OUT OF COMPLIANCE? GET INFO TO ROCHELLE

HOW BIG?

ODWMA

FREEMAN

31 TOTAL

9 >15 PPB

22 <15 PPB

USA ACTION PLANNER

©TOPS

NAME	
DATE	

TUESDAY NOVEMBER 10, 2015 — PAGE NO.
11:30 AM

PROJECT ACTION NOTES

- NEED LETTER TO FLINT

LEAD / COPPER RULE VS EXPOSURE

NEXUS & KUDGE

PROJECT PLANNING NOTES

- AFTER ACTION REVIEW TASK FORCE
- EPA IN FLINT TODAY (FULL REVIEW)
- ONGOING SCHOOL TESTING
- LEGISLATIVE & CONGRESSIONAL RESPONSE
- INTERNAL AFTER ACTION
- DHHS ISSUES
- ONGOING PROACTIVE COMMUNICATION
  - REFINING OUR MESSAGE
- UPDATE ON TECH. ADVISORY COMMITTEE

SYGO PHONE: EPA WANTS TO CREATE A RESEARCH PROJECT BY DIGGING UP SOME LEAD SERVICE LINES & LOOKING IN/O W.F.,

10 EPA STAFF

NOVEMBER 18TH

- ADAM
- SYGO
- STEVE

} GOV'S TASK FORCE

- MIKE
- LIANNE

} WOULD LIKE TO TALK SPEAK WITH THESE INDIVIDUALS

JEN ACTION PLANNER

TOPS

NAME

DATE

November 10, 2015

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

Time Line with Q&A Draft
To be Ready By This Friday
So That Govs Panel Can Review
it over the weekend.

Create Executive Summary ?

1) Whats your opinion (as Director) of what Happened & Why ?

2) What Actions are you taking

November 12, 2015
King Meeting

JEN ACTION PLANNER

TOPS

NOVEMBER 12, 2015

INTERNAL ACTION REVIEW 3:00PM

PAGE NO.

GOVS TASK FORCE QUESTIONS

PROJECT / OTHER NOTES

- UPDATE ON 10 POINT PLAN } KAREN
- CONCERNS THAT TAC IS NOT REFLECTIVE OF COMMUNITY
- EMERGENCY HEALTH PROTOCOLS WITHIN DHHS SHOULD THEY BE DEVELOPED?

PROJECT PLANNING NOTES

- SCHOOL DATA
- INDIVIDUAL DATA

SUNDAY 1:00 PM
MESSAGE DEVELOPMENT

ACTION PLANNER

STOPS

NAME

DATE

PROJECT ACTION NOTES

#17 Senior Education Surplus
#16 Other
#15 Public Outreach
#14 Dr Joan Rose
#13 TAC
#12 Enforcement Response
#11 Require CDC Control Study
#10 Lead Education Program

ID & →

JEN ACTION PLANNER

NOVEMBER 13, 2015
WEEKLY FLINT MEETING 10:00AM

PAGE NO.

PROJECT PLANNING NOTES

SUNDAY NOVEMBER 15, 2015
PLANNING MEETING

MONDAY 11/16/15
FAQ on Flint DW
GOES TO AFTER ACTION COMMITTEE
CC: GOV
BAIRD
MUCHMORE
GOVS ATTORNEY
JARROD
(SHEAR FOR NOW) PRESS SECRETARY
HARVEY HOLLINS

- ROLL OUT OF SCHOOL DATA
- BLOOD LEAD DATA
- MEETING WITH MAYOR
- MARC EDWARDS
- SAMPLING PROTOCOL
- LEAD SERVICE LINE REPLACEMENT
- EPA PARTNERSHIPS

STOPS

PROJECT

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

ACTION ITEMS

- SEND LETTER RECOMMENDING BENCH TOP STUDY TO BE DONE ASAP. SINCE THE INTAKE IS OPERATION

EA ACTION PLANNER

STOPS

NAME

DATE

FLINT ACTION PLAN

NOVEMBER 15, 2015

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

DEQs FLINT ACTION PLAN
19 ITEMS

#1 AFTER ACTION PLAN (FAQ)
WILL BE READY BY NOON ON 11/16/15

#2 SCHOOL TEST DATA
- REPORTS NOT HELD
- SIEVE REPORTS
- GEORGE SPREADSHEET

#3 BLOOD EXPOSURE
DEAN TO SPEAK WITH NICK

#4 MEETING WITH MAYOR
HARVEY HOLLINS LEAD
DAN, JIM, GEORGE

#5 MARC EDWARDS

#6 SAMPLING PROTOCOL
- ESTABLISH RELATIONSHIP WITH EPA REGION 5 (GENERAL AGREEMENT ON PROTOCOL)

LIANE POINT ON PROTOCOL FOR LCR

LIANE BL PROTOCOL LINK TO COMMENT ON FROM EPA

JEN ACTION PLANNER

ICTOPS

NAME

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

#7 LEAD SERVICE LINE REPLACEMENT

- AMY SPIKEY, MAGGIE, SONYA

RLF DIRECTED AT LEAD SERVICE LINE REPLACEMENT

#9 → - MEET WITH MOTT TO DO LEAD SERVICE LINE IDENTIFICATION

#6 CREATE RELATIONSHIPS WITH EPA

GEORGE TO ~~CROSS~~ WORK WITH JIM → JIM → BOB

DAN → SUSAN

MIKE & STEVE → KAREN & MEEE

ACTION ITEM * * GEORGE TO OUTREACH TO TOM FINKE * *

#10 LEAD EDUCATION PROGRAM

DAN & NICK

DHHS POINT

JEN ACTION PLANNER

CTOPS

NAME

DATE

PAGE NO.

#11 MOVING KWA FORWARD

PROJECT ACTION NOTES

#19 MAKE RECOMMENDATIONS TO EPA ABOUT LCR

#18 NEED A LIST OF SYSTEMS THAT ARE OUT OF COMPLIANCE

JEN ACTION PLANNER

PROJECT PLANNING NOTES

#12 ENFORCEMENT RESPONSE
WAIT UNTIL AFTER DEC 30TH

#13 TAC ← MONITOR CLOSELY

#14 — DAN BOND IN JOHN ROSE

#15 PUBLIC OUTREACH
LAGOA ITEM FOR
BROADER GROUP CONVERSATION

1) MAYOR
2) GCHD
3) HURLEY DR. ← REYNOLDS ALSO WEEKS & DAVIS (INCLUDE EDEN)
4) MINISTERS
5) LAND BANK
6) LEGISLATORS

#16 COMMUNICATE WITH OTHER PWS's

#17 LETTER TO SCHOOLS
EPA GUIDANCE ON TESTING
WORK WITH STATE SCHOOL SUPER

CTOPS

NAME

DATE

PROJECT ACTION NOTES

NOVEMBER 16, 2015
8:00 AM

PAGE NO.

PROJECT PLANNING NOTES

25 NEW HOMEPAGE
26
27
28
29
30 11/16/15 9:45 AM
31
32
33
34
35
36 - CONCERNS - LAWSUIT THAT
37 NRDC INTENT TO SUE
38 RTAB
39
40 - FLYERS SUBMISSIONS
41
42
43
44
45
46
47
48

RTAB

JEN ACTION PLANNER

TOPS

NAME

DATE

NOVEMBER 17, 2015
1:00 PM

PAGE NO.

PROJECT ACTION NOTES

- DBL TOXIC BEING IMPLEMENTED
- AMBIGUOUSNESS OF LCR

9

9

PROJECT PLANNING NOTES

1 INTERNAL ACTION REVIEW MEETING
2
3 FAQ SENT TO TASK FORCE
4 THIS MORNING
5
6
7
8
9 - CREEK SAMPLING PROTOCOL APPROVED BY EPA
10
11 - SCHOOL EDUCATION PROGRAM
12 - LEAD SERVICE LINE REPLACEMENT
13
14
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22
23
24

JEN ACTION PLANNER

TOPS

NAME

DATE

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

25 * GEORGE TO PULL COPPER RESULTS FOR FLINT LCR SAMPLES *

27

28

29 ALVIN BENTLY

30 CONFERENCE RM

31 1:00 PM

32

33

34

35

36

37

38

39

40

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48

ACTION PLANNER

TOPS

NAME

DATE

NOVEMBER 20, 2015

10:00 AM

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

SUPPLEMENTAL

MIKE → ATTACHING PHOSPHATE

~~STOP~~ ADDITION EQUIPMENT

NATASHA

- LOCATE ~~10~~ UP TO 150 LEAD LINES TO UTILIZE FOR LCR

- COMMUNICATIONS TO GO TO NATASHA & MIKE

- SEND OUT COMMUNICATION THAT NATASHA BE COPIED ON ALL FLINT COMMUNICATIONS

JIM TO SPEAK WITH BOB KAPLAN

TENTATIVELY SCHEDULE DEC 11TH FOR MEETING WITH FLINT, EPA, DEQ & LAN

JEN ACTION PLANNER

©TOPS

NAME

DATE

11/24/15

8:00 AM WEEKLY MEETING WITH PROJECT TEAM (UCAPA & DHHS)

PAGE NO.

PROJECT ACTION NOTES

SINCE 4/14

181

716 IDENTIFIED IN OCTOBER

197 TOTAL CHILDREN UNDER 6 YRS

FLINT ZIP CODES 01-07

10:00 AM KPMG MEETING

MADHU JULIA

GEORGE KIRBY

CAROL

ANASTASIA

ANASTASIA → GROWTH NUMBER OF EMPLOYEES

55 STAFF 34 FTE's + 9 STUDENTS + GROWTH

64 SQ FT/PERSON = 3,520 SQ FT

* - NEED TO KNOW WHAT KPMG/HOK WANT BEFORE THE MEETINGS *

JEN ACTION PLANNER

TOPS

NAME

DATE

11/24/15

11:10 AM

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

INTERNAL AFTER ACTION MEETING

SEE NOTES ON PARTNERING PLAN

4:30 PM
CONFERENCE CALL WITH GOVERNOR'S OFFICE

KEN (SIKANA?)
- FOCUS ON 3 CONCERNS
1) LACK OF UNFETTERED ACCESS TO INDIVIDUALS
2) OVER ALL RESPONSIBILITY
3) NICK LYON OFFICE OF EMERGENCY RESPONSE

ISSUE #1: ERIC WENT TO FLINT
MET W/ MAYOR & HENDERSON (HENDERSON)
CAN'T MEET WITH STATE WITHOUT ME BEING PRESENT
NOT AN ISSUE WITH DEQ
THIS IS AN ISSUE AT THE LOCAL LEVEL

JEN ACTION PLANNER

TOPS

NAME

DATE

ISSUE #1

PAGE NO.

PROJECT ACTION NOTES

1) HENDERSON IDENTIFIES AS ROADBLOCK

2) UNABLE TO SPEAK WITH SOME LEAD EXPERTS AT EPA

CAON

RICH NICK & DAN TO WORK TOGETHER

PROJECT PLANNING NOTES

RICH TO TAKE THE POINT ON DEALING WITH EPA STAFF

NEED E-MAILS FROM APRIL TO TASK FORCE

ISSUE #2

IS THERE ONE SINGLE POINT PERSON TO MARSHALL ALL RESOURCES STATEWIDE

DAN → WATER ISSUES
NICK → HEALTH ISSUES

CAN NARROW IT DOWN TO ONE PERSON IF NECESSARY

ACTION PLANNER

©TOPS

NAME

DATE

NOVEMBER 30, 2015

8:00 AM SMT PRE-MEETING

PAGE NO.

PROJECT ACTION NOTES

THIS WEEK

- FLINT
  - 8 SCHOOLS DOWN
  - 5 MORE TO GO
  - PLUS 4 PRIVATES
- MEETING W/ JOAN ROSE
- MEETING W/ SUPERINTENDENT
- MEETING WITH MAYOR / HARVEY
- DHHS BLOOD LEAD RESULTS THIS WEEK MAYBE
- SAMPLING THIS SATURDAY
- EISENHOWER RESULTS TO BE POSTED

JEN ACTION PLANNER

PROJECT PLANNING NOTES

1 ANGELA AYERS (GOV'S OFFICE)

2 → COORDINATE ASIAN CARP INITIATIVE

3

4 KAREN → YEAR END ACCOMPLISHMENTS LIST

5

6

7 ISSUES IN THE MEDIA - FLINT

8 - CAFO

9 - PIPELINES

10 - BLUE GREEN ALGEA

11 - PHOSPHORUS REDUCTION PLANS

12 - NET PENS

13

14 JIM - DOCUMENT FROM EPA REGARDING FLINT R&D

15

16

17

18 NEXT MONDAY: EXEC PARTY 2:00 - 3:30 PM

19

20

21

22

23

24

©TOPS

FROM:

CO./DEPT.:

NOVEMBER 30, 2015

8:30 AM SMT MEETING

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES







URC

UNIVERSITY RESEARCH CORRIDOR

(MSU, UM & WAYNE ST)

TRUST PLAN

COMMUNICATIONS PLAN

GET TO THE LEAD OUT

NOVEMBER 30, 2015

9:45 AM MEETING WITH JOHN ROSE

- SPLIT SAMPLING

BRING IN KETTERING?

TUSCON WATER ISSUE (EARLY 90s)

WATER COUNCIL (MILWAUKEE)

MAJOR ISSUES

1) DID DEQ REACT QUICKLY ENOUGH?

2) LEAD & COPPER RULE IS AMBIGUOUS

3) WERE THE SAMPLES FROM THE CITY ACTUALLY TIER 1 SITES?

3 MAJOR THINGS THAT NEED TO BE DONE

NAME

DATE

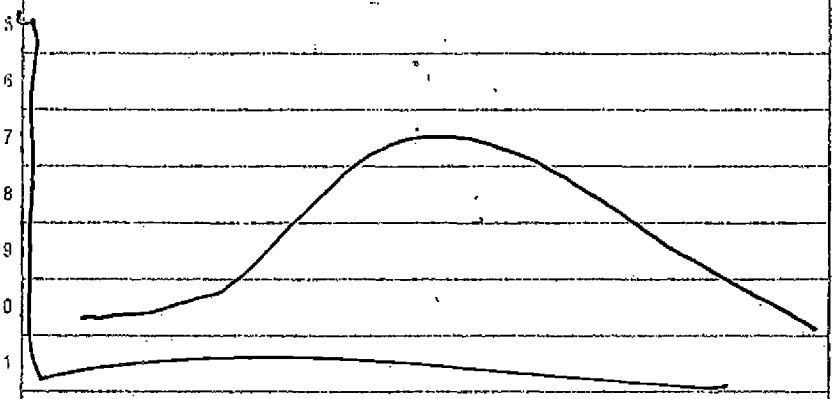
PAGE NO.

PROJECT ACTION NOTES

JEN ACTION PLANNER

PROJECT PLANNING NOTES

W S Sv FA



TOPS

NAME

DATE

WEDNESDAY DECEMBER 2, 2015
8:30 AM

PAGE NO.

PROJECT ACTION NOTES

- OUT OF COMPLIANCE SUPPLIES LIST TO BRAD

PROJECT PLANNING NOTES

- EISENHOWER DATA - BLOOD LEAD DATA

- MEETING WITH THE MAYOR TOMORROW
  - DISCUSS 18 POINT PARTNERING PLAN

* NEED TO MEET WITH KWA TO IDENTIFY BOTTLENECKS

* NEED TO PARTNER WITH MDOT TO WORK WITH ROAD COMMISSION

* NEED TO SPEAK WITH GCHD AS TO WHAT NEEDS TO BE DONE TO LIFT THE HEALTH ADVISORY.

JEN ACTION PLANNER

TOPS

NAME

DATE

WEDNESDAY DECEMBER 2, 2015
11:00 AM

PAGE NO.

PROJECT ACTION NOTES

- COMMITMENT TO SOLVING THE PROBLEM
- WE HAVE A PLAN INTERLOCKED SHORT, MED, LONG TERM RESOURCES
- NEED TO REBUILD TRUST RECOGNIZE SERIOUSNESS OF ISSUE TRUST, FEARS

JEN ACTION PLANNER

PROJECT PLANNING NOTES

- WE ARE COMMITTED
- WE HAVE A PLAN
- WE ARE MOVING FORWARD
- WE RECOGNIZE THAT WE NEED TO RE BUILD TRUST

NEED TO BRING

- 10 PT PLAN
- DEL TORO MEMO (FINAL VERSION)
-

OCTOBER 2, FORWARD

KEY STEPS TO MAKE THINGS

©TOPS

NAME

DATE

WEDNESDAY

SCHOOL FAMILY TEAM MEETING 3:30 PM

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

POTTER ELENTARY

WK 1

GEORGE

TRACEY JO

LOIS

JEAN

WK 2 LIZ

JEAN

TRACEY, JO

GEORGE

JACK

LIANE

WHO WRITES UP REPORTS AFTER FLINT SCHOOLS

- NEED TO REVIEW & APPROVE DRAFT

SAMPLE SET UP PROTOCOL FOR SAMPLE LOGIN

JEN ACTION PLANNER

TOPS

NAME

DATE

THURSDAY DEC 3, 2015
8:30 AM @ DWRL FUND

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

FLINT INFRASTRUCTURE (LONG TERM)

CHANGE TO ANY PRIVATE SERVICE LINES
CHANGE FROM RESIDENTIAL SERVICE LINES

O&M PIECE
DROPPING

REPAY LOAN & HAVE ADEQUATE REVENUE TO OPERATE THE SYSTEM

PROJECT PLANS ARE GOOD FOR 5 YEARS
- SUPPLY DEFINES WHAT THE NEEDS ARE
- SUPPLY DOES NOT NEED TO IMPLEMENT ALL PARTS OF THE PLAN

7500 - 2000 VALVES UNKNOWN STATUS

TRANSMISSION & DISTRIBUTION
37 MILLION CIP
CAPITAL IMPROVEMENTS PLAN
BASED ON 550 MILES
LIKELY 800 MILES THOUGH

FLINT HAS BEEN CONDUCTING LEAK DETECTION SINCE 2015

SUBMIT BY MAY 1ST

STORMWATER ASSET WASTEWATER MGMT

STILL OWE ABOUT 10 MILLION ON PREVIOUS LOANS

JEN ACTION PLANNER

CTOPS

NAME

DATE

PROJECT ACTION NOTES

FLINT NEEDS TO DO A "RELIABILITY STUDY" SO ~~THEY~~ IN ACT 399

THIS WOULD BE THE STARTING POINT FOR WORKING WITH THE GOV & THE ~~LEGISLATURE~~ LEGISLATURE

TUESDAY DECEMBER 3, 2015

8:30 AM DWRLF

PAGE NO.

PROJECT PLANNING NOTES

DWRLF

~ $5 MILLION SET ASIDE FOR STAFF

- THE PURPOSES FOR SET ASIDES ARE NARROWLY DEFINE

A RELIABILITY STUDY IS DUE IN 2016

SANITARY SURVEY

FLINT DOES RELIABILITY STUDY

DEQ DOES SANITARY SURVEY

↓

LEAD INTO A CAPITAL IMPROVEMENT PLAN

↓

PROJECT PLAN

JAN 2018 ASSET MANAGEMENT PLAN

NEED TO START WORKING ON THIS

...E ACTION PLANNER

©TOPS

NAME

DATE

DECEMBER 3, 2015
10:00 AM MEETING WITH FLINT MAYOR

PAGE NO.

PROJECT ACTION NOTES



PROJECT PLANNING NOTES

MAYOR'S ITEMS
- TRUST
- WHAT CAN [illegible] CAN BRING TO THE TABLE

FRIDAY DECEMBER 4, 2015
10:00 A.M. MEETING WITH FLINT MAYOR'S OFFICE

WEDNESDAY OF NEXT WEEK IS
ANTICIPATED DATE FOR SUPPLEMENTAL
PHOSPHATE ADDITION.

* * * * * * * * *
* GEORGE TO SEND E-MAIL *
* TO JIM HENRY TO *
* MAKE SURE HE COMES ON FRIDAYS *

JEN ACTION PLANNER

©TOPS

NAME

DATE

PAGE NO.

FRIDAY DECEMBER 4, 2015

12:00 NOON MEETING WITH SUPERINTENDENTS OFFICE

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

- 8 SCHOOLS SAMPLED SO FAR 2 POSTED
- MEET WITH KWAN - EISENHOWER YESTERDAY
  GOAL 1 POST A WEEK
- ACCESS TO HIGH SCHOOLS

DEC 23 — JAN 3RD

EVALUATE ON 28TH & 29TH

SAMPLE ON 29TH & 30TH

HIGH - SCHOOLS

S WESTERN 28TH & 29TH

N WESTERN 29TH & 30TH

TO SUE & TONY

SEND SPREAD SHEETS ELECTRONICALLY

9 N ACTION PLANNER

TOPS

NAME

DATE

Friday December 4, 2015

2:30 PM Internal Action Meeting

PAGE NO.

PROJECT ACTION NOTES

1. Good Natured Conversation
2. Need to go very simple
3. Pay for everything
4.

PROJECT PLANNING NOTES

- E-Mail Tim Henry.
- Send Spread Sheets To Super & Tony

JEN ACTION PLANNER

TOPS

NAME

DATE

DECEMBER 9, 2015

EPA CONFERENCE CALL 12:00 - 1:30 PM

PAGE NO.

PROJECT ACTION NOTES

#6 MUTE

#6 UNMUTE

PROJECT PLANNING NOTES

	FLINT	DEQ	EPA
25	MIKE GLADON	JIM	BOB KAPLAN
26		GEORGE	MIGUAL
27		LIANE	TIM
28		RICHARD	MIKE SCHOCK
29		STEVE	DARREN LYTLE
30		MIKE	
31			
32			

33 DISCUSSION RE PROTOCOL AS AMENDED.

34 MIGUAL (DEL TORO) → OVERALL DOCUMENT LOOKS

35 BEYOUND A TRADITIONAL CORROSION

36 CONTROL PLAN.

37 PERHAPS DOCUMENT BE BROKEN DOWN

38 INTO TWO DOCUMENTS

39 1) ABSOLUTE NEEDS

40 2) ACTIONS TO TAKE THAT CAN

41 BE DONE MOVING FORWARD &

42 DOES NOT HOLD UP SWITCH TO KWA

43

44 MIKE G. FLINT HAS HIRED

45 AN OUTSIDE CONSULTANT TO IDENTIFY

46 150 TIER 1 SITES FOR A

47 LCR SAMPLING POOL.

48

CARD TO BE ALL DIGITIZED BY MID FEB 2016

JEN ACTION PLANNER

TOPS

NAME

DATE

PROJECT ACTION NOTES

PLANT RATED FOR 36 MGPD

ACTUAL USE IS 12-15 MGPD

CAN WE GET AWAY WITH A TEMP LINE THAT DELIVERS 5MGPD TO GET PLANT UP & RUNNING?

JEN ACTION PLANNER

DECEMBER 9, 2015

EPA CONFERENCE CALL 12:00-1:30 PM

PAGE NO.

PROJECT PLANNING NOTES

MIKE:

1) PROVIDING A TEMP LINE FOR LAST 3 MILES DOWN SIDE COST

2) UTILIZE INTERCONNECTS WITH THE COUNTY (HAVEN'T BEEN USED IN YEARS)

TOP

NAME

DECEMBER 9, 2015 4:30 PM

PAGE NO.

TOP INTERNAL AFTER ACTION PLAN

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

25 - EPA MEETING

26 - SUPPLEMENTAL PHOSPHATE ADDITION

27 - BROWNELL DATA (POSTED)

28 - POTTER ELEMENTARY (556)

29 - LAWYER CONTACTED ME YESTERDAY

30 - 1 PPB SENT TO COMS

31 - CCHD HAS NOT RESPONDED

32

33

34

35

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JEM ACTION PLANNER

©TOPS

NAME

DATE

DECEMBER 10, 2015
10:00 AM HOK MEETING

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

3 POTENTIAL AREAS OF CONSOLIDATION

1) STORAGE CONSOLIDATION
2) OPERATIONAL (EQUIPMENT / INSTRUMENTATION) ?
3) CONSOLIDATED STAFF ?

- CONSENSUS = CO-LOCATED SUPPLY STORAGE

- CONFERENCE ROOMS
  CAN THESE BE SHARED ?

OFFICE CLOSED DOORS & WALLS
DIMB 17 LEVEL & ABOVE
UNLESS JUSTIFICATION GIVEN

SCOTT CHANDLER

JEN ACTION PLANNER

TOPS

NAME

DATE

FRIDAY DECEMBER 11, 2015

10:00AM FLINT MAYORS OFFICE

PAGE NO.

PROJECT ACTION NOTES

ATTENDEES

EPA

DARREN LYTLE

TIM HENRY

TOM POY

(TO CALL IN) BOB KAPLAN

JEFF KAMLE

DEQ

LIANE

COE

MIKE GLANCOW

PROJECT PLANNING NOTES

MIKE P

NATASHA H

STEVE B

MAYOR WEAVER

GEORGE K

LAN & MISC

EDEN WELLS - DHHS

ANDI SMITH

JEFF HARSO — LAN

SAMIR — LAN

SHELLY E - DLARA

PHOSPHATE ADDITION ON LINE

CONTROL STATION #2

YESTERDAY 3.2

DISTRIBUTION SITE 29

~1 PPM AS P

DOT RESEVOIR FULL OF DETROIT WATER

CHLORINE RESIDUAL STILL A LITTLE HIGH

12" FEED LINE FOR 3 MILES

3-4 MGPD CAPACITY

JET MOTION PLANNER

TOPS

NAME

DATE

FRIDAY DECEMBER 11, 2015 10:00 AM
FLINT MAYORS OFFICE

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

EPA DISCUSSION ON CORROSION CONTROL

BOB KAPLAN
↳ HAND DISCUSSION TO TIM HENRY

DOCUMENT BROKEN INTO DIFFERENT PIECES

BACKGROUND INFORMATION EPA WOULD LIKE TO GET

HOW TO ASSESS WATER TO DETERMINE THAT WATER IS OPTIMIZED

EPA RECOMMENDS USE OF THE 12" LINE SO THAT CORROSION CONTROL CAN BE TESTED ON A LARGER SCALE SO THAT THERE IS MORE ASSURANCE THAT PROCESS WILL CARRY OVER IN REAL WORLD.

EPA
- CAN'T TELL HOW LONG THIS WOULD NEED TO GO ON.

DARREN → UTILIZATION OF LEAD PIPE LOOPS IN THE PLANT

NEED TO CONSIDER CHANGING FILTER MEDIA INSTEAD OF UTILIZING USED MEDIA

JEN ACTION PLANNER

CTOPS

NAME

DATE

DECEMBER 11, 2015 10:00 AM

FLINT MAYOR'S OFFICE

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

STEVE B.

TIME CONSTRAINTS

- TIME TO BUILD LINE
- COST WOULD BE ~14 MILLION
- PRODUCING WATER THAT WON'T BE UTILIZED & COST ASSOCIATED WITH THAT

DARREN

COST WITH RISK OF NOT DOING THIS

STEVE

CONSIDER OPTIONS OTHER THAN FULL SCALE OPERATIONS TESTING

NATASHA: NEED TO USE CAUTION TO MAKE SWITCH GOES SMOOTHLY BUT NEED TO BE CAREFUL NOT TO OVERREACT & MAKE PROJECT GO OVER BUDGET & DELAY UNREASONABLY

WARREN WHEELER OFFICE

LAN MOVING AWAY FROM FERRIC TREATMENT & TO SOMETHING THAT IS EASIER & SAFER TO HANDLE WILL REDUCE OTHER HEADACHES AS WELL

ACTION PLANNER

STOPS

NAME	
DATE	

DECEMBER 11, 2015 10:00 AM
FLINT MAYORS OFFICE

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

LAW TWO OPTIONS

1) TEST WATER AT WHITESTONE POINT.
GET WATER RIGHT, N OFF THE LAKE

CAN BE DONE FOR BASICALLY FREE.

2) GET WATER OFF THE INTAKE
THAT IS INSTALLED
NOT QUITE READY YET THOUGH

SEND U.M
HENRY A NOTE:
COPY SUPER & TONK & WATASHA

JEN ACTION PLANNER

©TOPS

NAME

DATE

DECEMBER 14, 2015 8:00 AM

MONDAY MORNING EXEC MEETING

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

WEED DAN TO AFTER ACTION COMMITTEES
REQUEST BY KEN SIKKEMA

SUSAN HEANEY TO NRDC
IN LIGHT OF ACTIONS TAKEN THE EPA
COULD DISMISS THE REQUEST

MOVING FORWARD

-10 PT

-16 PT

- LATEST GOVS UPDATE

TO DAN

- JOHN: EPA COMING THIS WEEK
SET PRIORITIES FOR THE YEAR

JEN ACTION PLANNER

©TOPS

NAME

DATE

PROJECT ACTION NOTES

LOOK UP HICA

- > 500 HOMEOWNER
- > 3/4 5 PPMS OR LESS
- ~ 92% 15 PPMS
- 11/13 FLINT SCHOOLS LAST 2 ON 28, 29, 30
- ~ 9-10 SCHOOLS DOORS NOW PUBLIC SCHOOLS SIGNED UP & WILL BEGIN IN JAN
- ISSUES SO FAR ARE FIXTURE RELATED

JEN ACTION PLANNER

MONDAY DECEMBER 14, 2015 8:30 AM

SMT MEETING

PAGE NO.

PROJECT PLANNING NOTES

1 SEND E MAIL TO
2 SUPERINTENDENT RE
3 FLUSHING HIGH SCHOOL SAMPLING
4
5
6

7
8 MONDAY DECEMBER 14, 2015 1:00 PM
9 MEETING WITH MALPH
10
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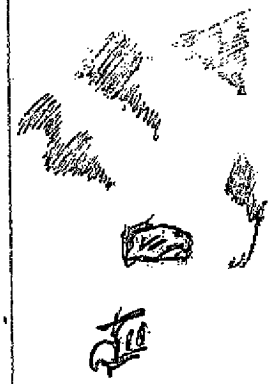
TOPS

NAME

Tuesday December 15, 2015 2:00 PM

PAGE NO.

PROJECT ACTION NOTES



PROJECT PLANNING NOTES

- FLINTWATERSTUDY.ORG

EPA CALL TODAY?

- FLINT WILLING TO MINIMIZE DETECTED TREATMENT PROCESS

3 OPTIONS

- TEMPORARY PARALLEL LINE

JEN ACTION PLANNER

TOPS

NAME

DATE

WEDNESDAY DECEMBER 16, 2015 10:30 AM

MEETING WITH OEA

PAGE NO.

PROJECT ACTION NOTES

(WEEKLY SUPERVISOR)

ERIC

POCAN ?

HARVEY HOLLINS APPOINTED

ACTION ITEMS

- EDEN SET UP MEETING WITH GCHD
- MAYOR & KWAN & OEA MEETING
- MAYOR TOUR OF LAB

JEN ACTION PLANNER

PROJECT PLANNING NOTES

THURSDAY DECEMBER 17, 2015 8:00AM

INTERNAL AFTER ACTION MEETING

GOVS AFTER ACTION ~~REVIEW~~ COMMITTEE

- RICH BAIRD
- COMMITTEE FOCUSED ON ACTIVISTS SIDE
- COMMITTEE TO POSSIBLY OVERSEE ONGOING ACTIVITIES
- REQUEST FOR SINGLE POINT OF CONTACT

- DAILY MEETING WITH COMMITTEE
  - COMMITTEE SPENT TIME EXPLAINING WHAT OEM DID WRONG

* DEVELOPMENT OF A STRATEGIC WATER FUND *

- TELL MAYOR & NATASHA THAT WE WILL ASSIGN A POINT PERSON TO ASSIST WITH TATER ASK

STOPS

NAME

DATE

FRIDAY DECEMBER 18TH 2015

FLINT CITY HALL MAYOR'S MEETING

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

- DWRF TIME LINE & PROJECT MANAGER ASSIGNMENT
- HARVEY HOLLINS
- EPA MEMO
-

MAYOR, ANN & SUE

FUNDING TO COVER
- SAMPLING SCHOOLS
- BRIEFLY DISCUSS LAB MOVE

FLINT CITY HALL PH & ACCESS

GUI 715 3550

373510 #

JEM ACTION PLANNER

TOPS

NAME

DATE

WED 12/23/15 8:30 AM

INTERNAL AFTER ACTION MEETING

PAGE NO.

PROJECT ACTION NOTES

POTTER ADMIN TO DANA

CONTACTS WITH STAKE HOLDER GROUPS

JEN ACTION PLANNER

PROJECT PLANNING NOTES

- EBL DATA
- HARVEY
- WEB PAGE
- HIGH SCHOOLS NEXT WEEK BTL

ORGANIZATIONAL STRUCTURE

- STRENGTHS & VULNERABILITIES

- STAKEHOLDER INTERACTIONS

- ASSISTANCE NEEDED FROM EXECUTIVE

Change in direction with our contacts with the media

All media contact to go through Mel Brandt

NAME

DATE

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

SEOC MEETING 1/16/16

9:00 AM

EDEN WELLS

LEAD - NEUROTOXIC

BODY WILL INCORPORATE LEAD & ESPECIALLY IF DIET IS CALCIUM OR IRON DEFICIENT

LONG TERM CHRONIC EXPOSURE

DEV & COG DELAYS

ATTENTION & BEHAVIRAL DISORDERS

2012 CDC LOWERED EBL FROM 10 TO 5 UG/DL

YOUNG CHILDREN & NEED TO BE SCREENED

- FIRST CAPILLARY TEST

IF LEVEL IS >5 THEN A VENUS TEST IS DONE.

IF CONFIRMED THEN NEED TO DO A FORMAL INVESTIGATION

NEEDS TO BE DONE TO IDENTIFY SOURCE

LEAD

- GAS
- PAINT
- PIPES

HOMES BEFORE 1978 LEAD PAINT

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NAME

DATE

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

SEASONALITY OF BLOOD LEAD LEVELS
3rd QUARTER

ALSO SEASONALITY ASSOCIATED WITH
LEAD IN WATER

45 IS THE CRITICAL LEVEL
& CHELATION TREATMENT NEEDED

EBL INVESTIGATIONS LOOK AT
ALL POSSIBLE PATHWAYS FOR EXPOSURE

FAMILIES CAN GET ASSISTANCE FOR
REMEDIATION

- IN ZIP CODES 03 & 04
BLL RATES WERE ELEVATED HHS
RECREATED THE DATA BUT
WAS NOT STATISTICALLY SIGNIFICANT

WAS THE INCREASE DUE TO WATER
- DON'T KNOW BUT CAN'T
RULE IT OUT

JEN ACTION PLANNER

TOPS

NAME

DATE

PAGE NO.

PROJECT ACTION NOTES

Jack Cell 5.
512 3969

Mark Bern
254-6712

181 Attempted Contact

109

24 Case Management

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PROJECT PLANNING NOTES

A LEAD LEVEL OF ZERO DOES NOT NECESSARILY MEAN THA THE CHILD WAS NOT EXPOSED

½ LIFE IS 30 DAYS SO TREATING EVERY CHILD AS HAVING POTENTIALLY HAVING BEEN EXPOSED

ONE ONE CHILD WITH LEVELS IN MID 30's

12 EBL INVESTIGATIONS HAVE BEEN DONE WATER HAS JUST NOW BEEN INCORPORATED

4. DUST

5

2 HOMES WITH LEAD DETECTED IN WATER

ALL FILTERS

> 23,000 FILTERS & CARTRIDGES GIVEN THROUGH ALL CHANNELS

TOPS

NAME

DATE

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

MT STAT → NEED MORE DETAIL

WHAT ARE WE DOING?,

- ANOTHER 6 MONTHS OF SAMPLING,
  WHY DO WE DO THAT?

DOSE

- DISCUSSIONS WITH EPA
- WE'VE ESTABLISHED AN INTERNAL
  CRISIS TEAM
- LOOKING AT GRANT OPPORTUNITIES
  TO PAY FOR THINGS
- STATE WIDE SCHOOL SAMPLING
  PROGRAM, DO WE HAVE ANY
  UPDATES ON THAT
- GRAPH FOR TREND OF
  FLINT HOME OWNER RESULTS

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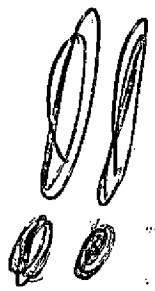
TOPS

NAME

DATE

PAGE NO.

PROJECT ACTION NOTES



PROJECT PLANNING NOTES

- GEORGE TO ASSIGN A POINT EITHER FROM THE LAB OR ODUMA TO PROVIDE INSTRUCTION ON SAMPLING.

JEN ACTION PLANNER

TOPS

NAME

DATE

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

DEQ STAFF HAVE BEEN MEETING WITH ~~THE~~ THE EPA & THE CITY OF FLINT TO DISCUSS PLANS FOR SWITCHING SOURCE WATER FROM DWSD TO KWA. EPA HAS RECOMMENDED THAT

~~J. Resurrection~~ 1/8/16

CITY OF FLINT 10:00 AM

- MAYOR / NATASHA
- LEAD SERVICE LINES ASSESSMENT
- INFRASTUCTURE EVALUATION COMPLETE

- EOC BEING SET UP IN FLINT 8:00-5:00
- ~~FREE~~ FREE STATIONS UTILIZED FOR BOTTLED WATER DISTRIBUTION

DONOR FROM FLORIDA $3K

JEN ACTION PLANNER

CTOPS

NAME

DATE

PAGE NO.

1/6/16

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

- LEAD SERVICE LINE REPLACEMENT VERIFICATION FOR THE 150 POINTS TO START NEXT WEEK

WEDNESDAY

9:30 AM

- LEAVE EMOTIONS AT DOOR
- PROVIDE SUMMARY OF SITUATION
- WHAT SHOULD I BE TOLD PRIMARY POINT

JEN ACTION PLANNER

TOPS

NAME

DATE

January 11, 2015
8:00 AM Meeting

PAGE NO.

PROJECT ACTION NOTES

EOC
EMERGENCY OPERATIONS CENTER

CAP
CHRIS KALINOSKY

NEED TO DO OUR HOMEWORK THOUGH SO THAT WE CAN WHAT THE

- STAKEHOLDER
- PARTNERSHIP
- CUSTOMER SERVICE

JEN ACTION PLANNER

PROJECT PLANNING NOTES

1 [redacted]
2 10:00 AM Gov Meeting
3 George Not Needed
4
5 GK To Accompany Director To
6 Event Press Conference
7
8
9 SMT 8:30 AM
10 - How Are We Going To Solve It
11 Easy To Say No, Need Solutions
12 ✓ Resources → Need To Identify
13 Needs, What Are We Trying To Accomplish
14 Establish Priorities
15 ✓ Rule #1 → No Surprises
16
17 - Maintaining Dam's & Guiding Principals
18 But Be Able To Define What These Mean
19
20 - When Will We Tell Our Story?
21 Our Story Will Involve What We
22 Are Doing Jan 4th Moving Forward
23
24

TOPS

NAME

DATE

Gov's OFFICE

11:00 AM MEETING

PAGE NO.

PROJECT ACTION NOTES

How Do

PROJECT PLANNING NOTES

- Mayor
- Tour of EOC
- Press Conference

- SHORT LIST OF GOALS

#1 → - EVERY HOUSEHOLDS NEEDS FILTER, BLOOD TEST, WATER TEST

#2
- LONGER TERM ACTION PLAN
- WHAT TO DO WITH EBL
- HOW DOES FLINT GET LONG TERM SA
- HOW ELSE CAN WE AIDE FLINT

#3 - WHAT IS THE STATE WIDE PLAN

CAPTAIN 10 PRIORITIES THAT FEED INTO GOVS TOP 3

- LIFE SAFETY TOP PRIORITY
- FILTER & DISTRIBUTION

JEN ACTION PLANNER

©TOPS

NAME

DATE

Gov's OFFICE

JAN 11, 2015

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

~~Possible Other Programs~~

- ADD A QUESTION TO THE DOOR 2 DOOR ARE THEY WILLING TO SERVE AS A TEST POINT WITH SAMPLES TAKEN BY PROFESSIONALS

SUPPLEMENTAL END OF THIS WEEK OR BEGINNING OF NEXT WEEK

** KEEP SAMPLES !!! **

NEED

- DIRECTOR
- 3460
- MADHU
- STEVE BUSCH
- GEORGE
- MIKE PRYSBY
- ADAM ROSENTHAL

Meeting

JEN ACTION PLANNER

TOPS

NAME

DATE

PAGE NO.

JAN 13, 9:30 AM Public Sector Consultants

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

TASK FORCE — What is their end results & work products

* The people of Flint deserve clean & safe water

- My Role:
  Act as point to coordinate efforts between DEQ & all partners

- Schools → 13 facilities → 2500 samples
- Will be address all schools, daycares, etc — 7200 facilities
- Coordination with DLARA on follow-up testing
- Development of a state wide school testing rec

Integration & Coordination
- Data sharing with DHHS

- State wide lead service line replacement program

Four findings:
- Minimalism
- Culture
- Tone
- Coordination

PARTNERS
- DHHS
- DLARA
- City
- Flint Schools
-

Present	Phone
Eric	Matt
Ken	Chris
Chris	
& Eric	
Rich	
Keith	
George	

10:30 Hard Stop

JEN ACTION PLANNER

STOPS

NAME

DATE

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

LAWRENCE
INTEGRATES
WITH TAC

JEN ACTION PLANNER

TOPS

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DATE

PAGE NO.

JANUARY 13, 2015

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

- EAGLES NEST
- MANLEY

SCHOOLS

NEED PLAN

- TIMELINES
- EXPECTATIONS

NEED HOME TESTING (ESSENTIAL SITES)

PLAN

JEN ACTION PLANNER

TOPS

NAME

DATE

Flint Mayors Office 10:00 AM

January 15, 2015

PAGE NO.

PROJECT ACTION NOTES

- Working through EOC to set up School Teams
- Preparing Lab for Samples

Reports

- WTP
- Needs 2 People for Reports
- To go out to residents

PROJECT PLANNING NOTES

Anthony Hubb → Flint Council

Jarrod - Gov. Chief of Staff

GOV

Natasha

- Testing on going
- PSL Lead Line Identification

Mike G

Switch

- KWA to run through plant for ~2 months before
- Interconnect with Genesee County
  - Eliminates River As Emergency Back-up
- Estimated Cost ~$7 Million with expedite fees To be split

Mike G & George K

To work on Sentinal Sites

Tony Sirko

Cell 810 397 8991

JEN ACTION PLANNER

STOPS

NAME

DATE

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

ICP/MS

RE-POLL DATA FOR DURANT - FUTURE - MOOT



PIERCE → OEA

DOYLE → OEA

ADMUS → HOOD

HOLMES → DANA

POTTER → STEVE

JEPPESEN ACTION PLANNER

TOPS

NAME

DATE

JANUARY 18, 2016

CALL WITH CITY OF FLINT

PAGE NO.

PROJECT ACTION NOTES

NEW PIPE FOR 2 MILES & 1 MILE OF RE-SLEEVING

16,400 FT OF NEW CONSTRUCTION LEADING TO 24 INCH LINE THAT WOULD BE RESLEEVED

PROJECT PLANNING NOTES

TONY CITY OF FLINT ATTORNEY

STEVE ARWOOD MDEQ

NATASHA & MIKE

42 INCH LINE INTERCONNECT WITH GC TO A 24 INCH LINE

6.3 MILLION COST

GC TO DO CONSTRUCTION

NEED TO BE DONE BY JULY 1, 2

JUST OVER 2 & 3 MILES

EXPEDITED CONSTRUCTION

JEN ACTION PLANNER

TOPS

NAME

DATE

PROJECT ACTION NOTES

QUESTION FOR MEL & MEGAN

DO WE WANT TO POST RESULTS

GOV

3 GOALS

- TOUCHING EVERY HOUSEHOLD IN FLINT
- WHEN CAN WE REESTABLISH THAT THE WATER IS SAFE TO DRINK
- HOW DO WE ESTABLISH FOLLOW UP CARE?
- HOW DO WE ASSIST THE CITY OVERALL

JEN ACTION PLANNER

GOVENOR'S OFFICE 1/20/16 4:15 PM

PAGE NO.

PROJECT PLANNING NOTES

FEDERAL AGENCIES THAT WILL BE INVOLVED

1 USDA
2 EPA
3 FEMA
ED
SBA
HHS
5 HUD

DR NICOLE LURIE
ASSISTANT SECRETARY FOR PREPAREDNESS & RESPONSE

- REFINE SIZE & SCOPE
- HELP CITY MAKE A PLAN FOR HAVING SAFE WATER.
- LONG TERM MITIGATION

THINGS THAT CAN'T BE DONE WITHOUT AN EXPLICIT ASK & SOME THINGS NEED MORE INFO

* WORK ON EPIDEMIC OF FEAR *

10 DAYS LEFT OF OPEN ENROLLMENT FOR THE AFFORDABLE CARE ACT

- CDC TO ASSIST IN ALLAYING FEARS?

TOPS

NAME

DATE

PAGE NO.

PROJECT ACTION NOTES

- JACK KIRBY TOO
& SEND JOE'S CONTACT INFO & TONY SITKO TO LIZ

PROJECT PLANNING NOTES

1 EVERY WK FLINT REPORT

2

3 SAMPLING PLAN NEEDS TO BE PUT TOGETHER *

4

5 NEED A PLAN FOR SAMPLING

6

7 3rd PARTY VALIDATION OF DEQ LAB

8

9 WHAT IS THE PROCESS FOR

10 STANDING UP A WTP ?

11

12 - NEED A BOX OF WIDE MOUTH

13 BOTTLES FOR @ REP NEELEY *

14 ASAP!!!

15

16

17 GEORGE TO GIVE FLINT *

18 UPDATES AT SMT

19

20

21

22

23

24

JEN ACTION PLANNER

TOPS

NAME

DATE

Jim Lanca

PAGE NO.

PROJECT ACTION NOTES

PROJECT PLANNING NOTES

EVERYONE IN FLINT DESERVES CLEAN WATER

5 PRONGS TO THE WATER TESTING

- RESIDENTIAL TESTING (CITY/DEQ)
- SCHOOLS TESTING (DEQ/DHHS)
- EBL INVESTIGATIONS (DHHS)
- FOOD SERVICE (MDARD) ESTABLISHMENTS
- SETTING UP SENTINEL SITES IN PROCESS (EPA, CITY, DEQ)

HERE'S WHAT WE ARE DOING TO ENSURE THAT

REASON WHY

RESIDENTIAL: IDENTIFY AREAS OF CONCERN & PROVIDE ADDITIONAL SERVICES AS APPROPRIATE

SCHOOLS: IDENTIFY SOURCES OF LEAD

EBL: DHHS TO SPEAK ON DETAILS

FOOD: JUST ROLLED OUT EVAL IN PROCESS

SENTINEL: USE TO HELP DETERMINE BASELINE TREND & HOPEFULLY HELP DEFINE WHEN EMERGENCY ORDER CAN BE LIFTED

Variations

JEN ACTION PLANNER

SINCE BEGINNING

≤5ppb 1502/1758 = 84.4%

≤15ppb 1666/1750 = 93.6%

SINCE 1/20/16

≤5ppb 678/759 = 89.3%

≤15ppb 722/759 = 95.1%

- SCHOOL REPORTS
- EPA ORDER
-

DTMB

Steve does

CRYSTAL REPORTS

NAME

DATE

8:00 AM 1/25/16

PAGE NO.

PROJECT ACTION NOTES

- FREE CHLORINE
- SAMPLE CONC UPDATE
- SCHOOLS UPDATE
- NEW LAS REPORT
- RASH INVESTIGATION
- LAB BACKLOG UPDATE
- SENTINEL SITES STATUS?
- J. DEED POSTED

PROJECT PLANNING NOTES

SENATE APPROPS ON UED

- EVERYONE DESERVES CLEAN SAFE WATER
- WE WILL WORK HAND IN HAND WITH EPA
- RESIDENTS SHOULD NOT WORRY ABOUT
- WELL BE WORKING WITH ALL OUR PARTNERS

8:00 AM EP BRIEFING

10:00 AM COMMANDS STAFF?

3:30 PM PLANNING MEETING

DEAN MARALDO

JEN ACTION PLANNER

TOPS

NAME

DATE

EPA Meeting @ KETTERING

1/27/16

PAGE NO.

PROJECT ACTION NOTES

10 WEEKLY SITES

25 MONTHLY SITES FOR MOR

INTERNALS 15 LITERS

Pb En *
Cu Fe * As well

50 SITES BEING TARGETED

PROJECT PLANNING NOTES

1 MIGUEL DELTORAL
2 TIM HENLY
3 DEAN MARALDO
4 MICHAEL BEACHUM
5 TOM POY
6 MIKE SCHOCK
7 MARK ROGERS DW MICRO
8 KENJI OSHIMA MICRO (NERL)
9 DARREN LYTLE
10 KELLY CREAGH
11 DAN LORD
12 GEORGE KRIKETIAN
13 TIM J460
14 BOB KAPLAN
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JEN ACTION PLANNER

TOPS

NAME

DATE

PAGE NO.

LARA 4:45 PM

PROJECT ACTION NOTES



1431 FILED BY EPA

JEN ACTION PLANNER

PROJECT PLANNING NOTES

1 MIKE ZIMMER

2

3

4 - 3rd PARTY VALIDATION

5 - WORKING OFF HOURS

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TO

NAME

DATE

2/4/16

PAGE NO.

PROJECT ACTION NOTES

877-226-9607

607-576-3458

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PROJECT PLANNING NOTES

CONFERENCE CALL WITH

EPA RE: RES CHLORINE

IN SCHOOLS

JONATHAN PRESSMAN

- NEED PROPOSED PROTOCOL
- SUPER MUST BE INFORMED IN WRITING & NO PUBLIC ANNOUNCEMENTS MADE WITHOUT HIS KNOWLEDGE
- RESULTS TO ALSO BE SHARED WITH DEQ PRIOR TO ANNOUNCEMENTS
- DEQ TO SHARE DATA AS REC

JEN ACTION PLANNER

TOPS

NAME

DATE

PROJECT ACTION NOTES

> 150 PPB Pb SAMPLES

PAGE NO.

POTENTIAL CHECK LIST ITEMS

- ITEMS THAT CAN INCREASE Pb/Cu

25 - STRAY VOLTAGE
26 - IMPROPER GROUNDING
27 - DIRTY AERATORS
28 - UNMAINTAINED FILTERS
29 - BRASS FIXTURES & BRASS ADJOINING VALVES
30
31
32
33
34
35
36
37
38 Dr. LORRIE 4:00 PM
39 FILTERS WORK AT HIGHER LEVELS
40
41 - EPA
42 - DHHS
43 - DEQ
44
45
46 -
47 -
48 -

15
4"
THE
MIN 2

JEN ACTION PLANNER

©TOPS

Sygo, Jim (DEQ)

From: Workman, Wayne (TREASURY)
Sent: Thursday, October 15, 2015 11:18 AM
To: Sygo, Jim (DEQ)
Cc: Saxton, Thomas (Treasury)
Subject: FW: Contract for Water

From: Dayne Walling [mailto:dwalling@cityofflint.com]
Sent: Thursday, October 15, 2015 11:02 AM
To: Muchmore, Dennis (GOV) <muchmored@michigan.gov>; Workman, Wayne (TREASURY) <WorkmanW@michigan.gov>
Cc: Natasha Henderson <nhenderson@cityofflint.com>
Subject: Contract for Water

Gentlemen, I have asked City Administrator Natasha Henderson to reach out to you at Treasury Wayne about the contract for Detoit water. The Mott Foundation has questions about payments and ensuring all parties are contributing to the monthly costs as well as how an escrow fund would work to ensure funds are solely for this purpose. Time is of the essence as you know and the City is prepared to do all things necessary for the water to begin flowing as quickly as possible as we have agreed. Thanks for your tremendous efforts on this and we look forward to finalizing the agreements hopefully today or tomorrow.

--

Dayne Walling
Mayor, City of Flint
City Hall, 1101 S. Saginaw St.
Flint, MI 48502
810-766-7346
mayor@cityofflint.com
www.cityofflint.com
follow me on twitter at http://twitter.com/mayorwalling

City of Flint
October, 2015
Quarter Watef Quality Report

The Quarterly Water Quality Report provides important information about your drinking water. This report includes information about the water source, current drinking water issues, lead information, water filters, testing, quarterly news, and temporary expectations when changing water sources. The City of Flint Department of Utilities is dedicated to providing quality drinking water to the residents of the community. The Flint Water Plant operates and maintains a certified drinking water laboratory to assure compliance with all state and federal regulations, and is committed to prompt and thorough notification to the consumers if there is any reason for concern about the quality of the drinking water. Information about your drinking water is available on the City of Flint web page at www.cityofflint.com or by calling the City of Flint Water Plant at **(810) 787-6537**. The Safe Drinking Water Hotline at **(800) 426-4791** is a resource for health related questions and water quality issues. General drinking water information can also be found on the U.S. Environmental Protection Agency (EPA) web site at www.epa.gov/safewater/

Water Source

The City of Flint began using the Flint River as a water source in May of 2014. After 16 months of treating water from the Flint River, the City became aware that the level of corrosiveness found in Flint River water could result in more lead leaching from service lines and household plumbing. Reports of elevated blood lead levels in children and expert analysis resulted in the City's Technical Advisory Committee making a recommendation to return to the previous source of water while waiting for the KWA to provide water from Lake Huron.

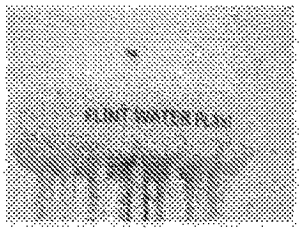
On Friday October 16th, 2015, with the consent of Governor Snyder, the City returned to Detroit as the primary source of drinking water. The decision, along with the Technical Advisory Committee's recommendation followed two consecutive lead and copper test periods that exceeded 5ug/L which calls for additional action. In addition to the switch, the City has submitted a final corrosion control design to the DEQ for comments and approval. The City has requested to use the corrosion control as an additive to treated water it will be required when the city begins treating raw water from the Karegnondi Water Authority which is anticipated to begin in the summer of 2016.

In order to make the transition possible, the City contributed $2 Million dollars, the Mott Foundation contributed $4 Million dollars, and the State of Michigan contributed $ 6 Million dollars.

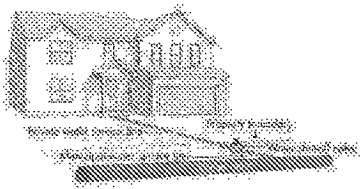
Current Drinking Water Issues & Lead Information

There has been a heightened awareness of lead leaching into drinking water through service lines and household plumbing. The City's Technical Advisory Committee has enlisted the support of EPA lead experts and is working with State of Michigan representatives to increase testing, rebuild public confidence, and implement long-term solutions to lead. It is recommended that everyone get their water tested, obtain a water filter, and check with a plumber to evaluate the type and condition of your household plumbing. The City is currently mapping all of its lead service lines and working to develop a program to get lines changed over time.

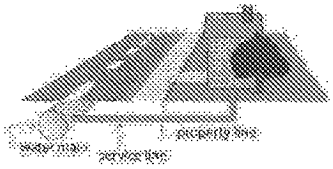
If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Flint is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 5 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.



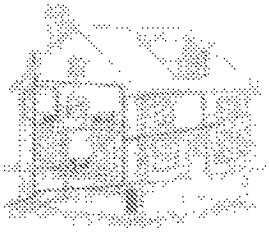
No lead in water leaving the Treatment Plant.



Little or no lead in water in the transmission mains.



Lead can leach into water through service lines.



Lead can leach into water through household plumbing.

Key to the Detected Contaminant Tables		
Symbol	**Abbreviation for**	**Definition/Explanation**
>	Greater than	
AL	Action Level	The concentration of a contaminant, which, if exceeded, triggers treatment or other requirements which a water system must follow.
HAA5	Haloacetic Acids	HAA5 is the total of bromoacetic, chloroacetic, dibromoacetic, dichoroacetic, and trichloroacetic acids. Compliance is based on the total.
LRAA	Locational Running Annual Average	
MCL	Maximum Contaminant Level	The highest level of a contaminant that is allowed in water. MCLs are set as close to the MCLG's as feasible using the best available treatment technology.
MCLG	Maximum Contaminant Level Goal	The level of contaminant in drinking water below which there is no known or expected risk to health.
mg/L	Milligrams per Liter	A milligram = 1/1000 gram 1 milligram per liter is equal to 1ppm
MRDL	Maximum Residual Disinfectant Level	The highest level of disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
MRDLG	Maximum Residual Disinfectant Level Goal	The level of a drinking water disinfectant below which there is no known or expected risk to health. MRLDG's do not reflect the benefits of the use of disinfectants to control microbial contaminants.
n/a	Not Applicable	
ND	Not Detected	
NTU	Nephelometric Turbidity Units	Measures the cloudiness of water.
pCi/L	Picocuries per Liter	A measure of radioactivity. Picocurie (pCi) means the quantity of radioactive material producing 2.22 nuclear transformations per minute.
ppb	Parts Per Billion (one in one billion)	The ppb is equivalent to micrograms per liter. A microgram = 1/1000 milligram.
ppm	Parts Per Million (one in one million)	The ppm is equivalent to milligrams per liter. A milligram = 1/1000 gram.
RAA	Running Annual Average	
TT	Treatment Technique	A required process intended to reduce the level of a contaminant in drinking water.
TTHM	Total Trihalomethanes	Total Trihalomethanes is the sum of chloroform, bromodichloromethane, dibromochloromethane and bromoform. Compliance is based on total.
ug/L	Micrograms per Liter	A microgram = 1/1,000,000 gram 1 microgram per liter is equal to 1ppb

2015 3rd Quarter Regulated Detected Contaminants – **Flint River as Source**

Inorganic & Organic Chemicals, Metals, and Pesticides – Monitored at treatment plant						
Regulated Contaminant	Unit of Measure	MCLG	MCL	Highest Level Detected	Range of Detection	Violation
Inorganic Chemicals						
Fluoride	mg/L	4	4	0.84	0.64 – 0.84	No
Nitrate	mg/L	10	10	N.D.	N/A	No
Metals						
Barium	mg/L	2	2	0.02	N/A	No

More than 100 other chemicals were monitored from July through September that were not detected.

The various classification groups of these chemicals include metals, carbamates, herbicides, pesticides, organics, and radiologicals.

Total Organic Carbon, TOC - Monitored at treatment plant			
Regulated Contaminant	Required Monthly % Removal	Minimum Monthly % Removal	Monthly % Removal Ranges
Total Organic Carbon	50	60	60 - 87

Turbidity - Monitored at treatment plant		
Highest Single Measurement (Cannot exceed 1NTU)	Lowest Monthly % of Samples Meeting Turbidity Limit (0.3 NTU in 95% of samples)	Violation
0.18	100 %	No

Disinfectant Residuals – Monitored in the distribution system						
Regulated Contaminant	Unit of Measure	MCLG	MCL	Highest Level Detected	Range of Detection	Violation
Total Chlorine Residual	mg/L	4.0	4.0	4.0	0.2 – 4.0	No

Microbiological Contaminants - Monitored in the distribution system				
Regulated Contaminant	MCLG	MCL	Highest Number detected (in 1 month)	Violation
Total Coliform bacteria	0	The presence of coliform bacteria in > 5% of monthly samples	1	No
E. coli Bacteria	0	0	0	No

Lead & Copper – Monitored from consumers tap					
Regulated Contaminant	Unit of Measure	MCLG	Action Level AL	Number of samples over AL	Total # of Samples Tested from January - September
Lead	ug/L	0	15	16	189
Copper	mg/L	1.3	1.3	0	189

Disinfection By-Products - Monitored in the distribution system and from treatment plant						
Regulated Contaminant	Unit of Measure	MCLG	MCL	Highest Level Detected	Range of Detection	Violation
Total Trihalomethanes (TTHM)	ug/L	n/a	80	90.3	42.6 – 90.3	N/A*
Haloacetic Acids (HAA)	ug/L	n/a	60	15.0	2.0 – 15.0	N/A*
Bromate	ug/L	10	10	N.D.	N/A	N/A*

*Violation based on locational running annual average for TTHM & HAA5, violation for bromate based on yearly average.

Water Filters & Testing

Free water filters have been made available to current Flint residents at several locations. The MDHHS and the Genesee County Community Action Resource Department (GCCARD) are providing Free National Sanitation Foundation certified water filters at the following locations. Residents receiving MDHHS assistance are encouraged to visit either the **125 E. Union St.** or **4809 Clio Rd. MDHHS** office location to obtain a free, certified home water filter. Residents who are not currently enrolled in MDHHS assistance programs should visit the (GCCARD) offices located at **2727 Lippincott** and **601 N. Saginaw** in Flint.

Staff will be onsite at all four locations from **9 a.m. to 4 p.m., Monday through Friday**, to distribute filters and assist residents who have questions about proper installation.
If you want more information on obtaining a water filter, please call 211.

Other suggestions related to water safety and testing:

- We recommend that everyone get their water tested. Call us at (810)-787-6537.
- Contact the Health Department about having your child's blood tested (810)-257-3612.
- It is advisable to have a plumber check your household plumbing.
- Check your faucet aerator (large lead solder particles can occasionally get lodged in here).

Things to Keep in Mind when Changing Water Sources

Changing water sources back to Detroit will not fully eliminate the lead concerns. The potential for lead to leach off of certain water service lines or household plumbing will continue to exist regardless of the water source. The City is committed to increased testing, better communication, and developing a lead service line map to identify all of the City owned lead service lines.
As the city changes water sources you can expect the following:

- It could take up to three weeks for the switch in water source to reach all taps in the City.
- Over the next several weeks, we will be winterizing our hydrants which will result in discoloration of the water but will also help accelerate the water flowing through the system.
- Lead will continue to leach off of certain service lines and household plumbing.
- Main breaks could result as a change in source water occurs.
- Water could have discoloration or cloudiness, if this happens, run your faucet until the water clears, if this lasts longer than 20 minutes please report it to our water service center at (810)-766-7202.

Water Timeline

A timeline of events, beginning with signing the KWA contract leading up to the current status of switching back to our previous source of water will be available on the City website and can be found by visiting the "water" page located under "residents". Please email flintwater@cityofflint.com with your questions or to request a water test or, call the Water Plant at (810)-787-6537.

3rd Quarter News

July

- Completed the evaluation of over 8000 valves in the system and identified over 2300 that are currently inoperable. The repair of these valves will be budgeted and worked into our multi-year Capital Improvement Plan.

August

- Successfully completed the installation of Granulated Activated Carbon at the water treatment plant which reduced the TTHM level in the water and helped bring the City back into compliance with the Safe Drinking Water Act.

September

- Leak Detection on all 600 miles of the distribution system has started and is over halfway complete. Several dozen leaks have been identified and repairs continue as more leaks are found. This has decreased the amount of water loss existing in the system.
- Construction of a load out facility at our wastewater plant is on target for completion by November and will allow the City to eliminate the use of the incinerator resulting in significant annual savings.
- Over 3500 new water meters have been installed this year creating better accuracy, accountability, and decreasing the number of estimated reads on water & sewer bills.

Contact Information

Water Treatment Plant - (810)-787-6537
Request a water test.
Request a tour of the Plant.
Ask questions about water quality.

Water Service Center - (810)-766-7202
Report a water leak or other system issues.

Water Pollution Control - (810)-766-7210
Inquiries related to wastewater treatment.
Inquiries related to converting methane gas into energy.

Customer Service – (810)-766-7015
Questions about your water & sewer bill.

Water Filters – 211
Questions about water filters.

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

KEITH CREAGH
DIRECTOR

Examining Federal Administration of the Safe Drinking Water Act in Flint, Michigan

Testimony Before the U.S. House of Representatives
Committee on Oversight and Government Reform
Michigan Department of Environmental Quality Director Keith Creagh
February 3, 2016
9:00 a.m.

Chairman Chaffetz, Ranking Member Cummings, and members of the Committee on Oversight and Government Reform, thank you for the opportunity to be here today to discuss the Flint water crisis. My name is Keith Creagh, and since January 4, 2016, I have served as Director of the Michigan Department of Environmental Quality (MDEQ).

I want to start by apologizing to the residents of Flint. In retrospect, government at all levels should have done more. We must fully investigate what happened in order to make sure it will never happen again. In addition, and most urgently, we must fix the problem for the people of Flint.

This is a complex issue due, in part, to the multiple levels of government oversight. The City of Flint (the City) is responsible for the daily operations of the water plant and the distribution system, including identifying sampling locations, collecting samples, and certifying that the samples meet the criteria of the Lead and Copper Rule. The State of Michigan (the State) is responsible for ensuring compliance with the Lead and Copper Rule and Safe Drinking Water Act. The U.S. Environmental Protection Agency (EPA) sets national drinking water standards, provides oversight to make sure those standards are met, and audits the State's program.

1:05

In Flint, the implementation of the federal Lead and Copper Rule was ineffective in protecting public health. When the first round of lead sampling came back at 6 parts per billion in January 2015, corrosion treatment was not implemented. Regardless of the testing schedule allowed by the EPA rule, in hindsight, when the lead levels began to rise, corrosion treatment should have been required by the MDEQ. As the Michigan Auditor General pointed out, the MDEQ's Office of Drinking Water and Municipal Assistance relied on technical compliance instead of assuring safe drinking water. It is noteworthy that the Lead and Copper Rule would have allowed up to 24 months to begin these treatments. It has now become clear that the federal Lead and Copper Rule is outdated and inadequate to protect the public from exposure to lead, especially in communities with aging infrastructure, such as Flint.

I am confident that the many reviews of this situation, from the U.S. Department of Justice to interagency teams, will address in-depth the policy and decision-making corrections needed to ensure that government at all levels can provide safe, clean drinking water to citizens.

While we could spend this whole morning trying to assign blame, I would first like to acknowledge the unwavering advocacy of EPA's Miguel Del Toral, Dr. Marc Edwards, and Dr. Mona Hanna-Attisha in helping to bring this problem to light. And I would like to spend the final few minutes discussing the coordinated State response that has been undertaken to fix this problem.

2:26

The State has been working hard to develop effective and responsive steps to address issues related to drinking water in Flint. On October 2, 2015, Governor Snyder announced a 10-step plan to address the Flint water emergency. On January 5, 2016, the State Emergency Operations Center was activated. Since then, we have handed out approximately:

100,000 Water filters

234,000 Cases of bottled water and

32,000 Water testing sampling kits.

I also want to highlight the State's five-prong sampling plan that addresses both the short-term and long-term needs of Flint. This approach includes the following:

1. Access to water sampling for all residents. Although this is not a scientific sampling pool, initial results have shown lead levels in the water with 93 percent of sampling of homes below the ~~actionable~~ Federal action level of 15 parts per billion.
2. Testing of additional schools, daycares, and nursing homes is underway.
3. Assessment of food establishment through the Michigan Department of Agriculture and Rural Development is occurring.
4. Home screening and additional follow up for children with elevated lead levels in their blood are being coordinated by the Michigan Department of Health and Human Services. And,
5. Identification of sentinel sites is occurring to allow for long-term monitoring and testing of the water, in conjunction with the EPA and the City.

3:42

The State will achieve the deliverables identified in the EPA Order sent on January 21. Since the issuance of the Order, the State and EPA have had productive and constructive conversations on a unified path forward. While we certainly appreciate the dialogue that has occurred, consultation with the State before the Order was issued would have provided clarity to many of the issues that the State was already underway in addressing. Indeed, it is puzzling that the Order was issued so long after the State response ~~efforts~~ began, and without mentioning the steps that were already underway.

To be successful, we, the State, need to have a high performing, trust-based partnership with the EPA, the City of Flint, and other agencies at local and county levels. I appreciate the relationships that have been established between myself, Mayor Weaver, and interim EPA Regional Administrator Bob Kaplan through our weekly calls and meetings ~~with the City~~.

In closing, we know the task ahead is important, as is the restoration of the public's trust. Governor Snyder is committed to providing the resources necessary to provide solutions. I look to our Congressional and federal partners to also provide leadership on federal resources that can be leveraged to address the problems related to the Flint water system. We will not rest until this problem is solved and the people of Flint are assured that they again have water that is safe for them and their families.

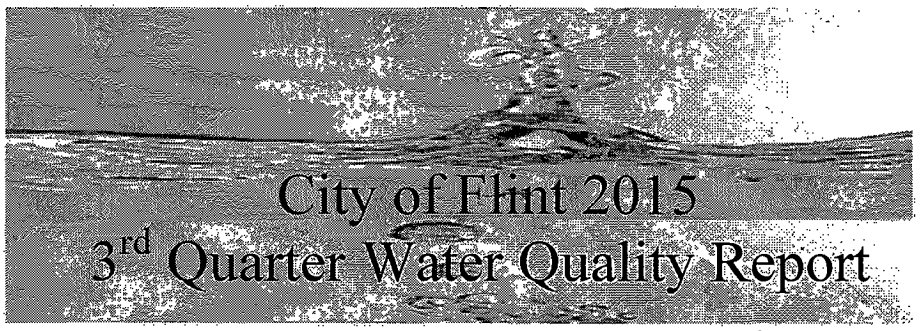
I thank you again for the opportunity to come before you today and look forward to answering any questions you may have.

5:08

Customer Service Center
City Hall
1101 S. Saginaw St.
Flint, MI 48501

Postage





The Quarterly Water Quality Report provides important information about your drinking water. This report includes information about the water source, current drinking water issues, lead information, water filters, 3rd quarter work accomplished, and a water timeline of events. The City of Flint Department of Utilities is dedicated to providing quality drinking water to the residents of the community. The Flint Water Plant operates and maintains a certified drinking water laboratory to assure compliance with all state and federal regulations, and is committed to prompt and thorough notification to the consumers if there is any reason for concern about the quality of the drinking water. Information about your drinking water is available on the City of Flint web page at www.cityofflint.com or by calling the City of Flint Water Plant at **(810) 787-6537**. The Safe Drinking Water Hotline at **(800) 426-4791** is a resource for health related questions and water quality issues. General drinking water information can also be found on the U.S. Environmental Protection Agency (EPA) web site at www.epa.gov/safewater/.

Water Source

The City of Flint began using the Flint River as a water source in May of 2014. After 16 months of treating water from the Flint River, the City became aware that the level of corrosiveness could result in more lead leaching from service lines and household plumbing. Reports of elevated blood lead levels resulted in the City's Technical Advisory Committee making a recommendation to return to the previous source of water while waiting for the KWA to provide water from Lake Huron.

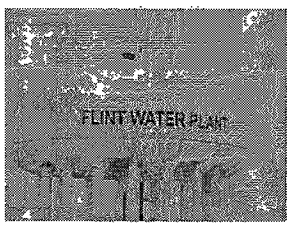
On Wednesday October 8, 2015, with the consent of Governor Snyder, the City stated they plan to return to its previous source of water. The decision followed two consecutive lead and copper test periods that exceeded 5ug/L which calls for additional action. In August of 2015 following the guidance of the DEQ, the City began also developing additional corrosion control measures that will be evaluated if it is needed as an additive to treated water but will be required when the city begins treating raw water from the Karegnondi Water Authority.

The City contributed $2 Million dollars, the Mott Foundation contributed $4 Million dollars, and the State of Michigan contributed $ 6 Million dollars to make the transition possible. The City expects the transition to occur in October.

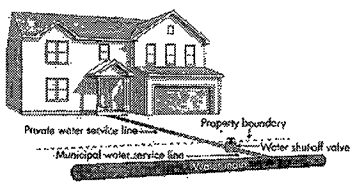
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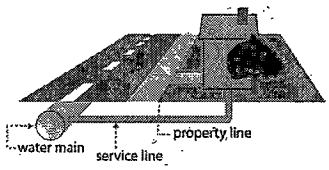
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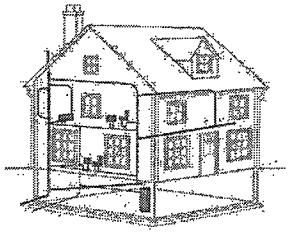
No lead in water leaving the Treatment Plant.



Little or **no lead** in water in the transmission mains.



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Water Filters

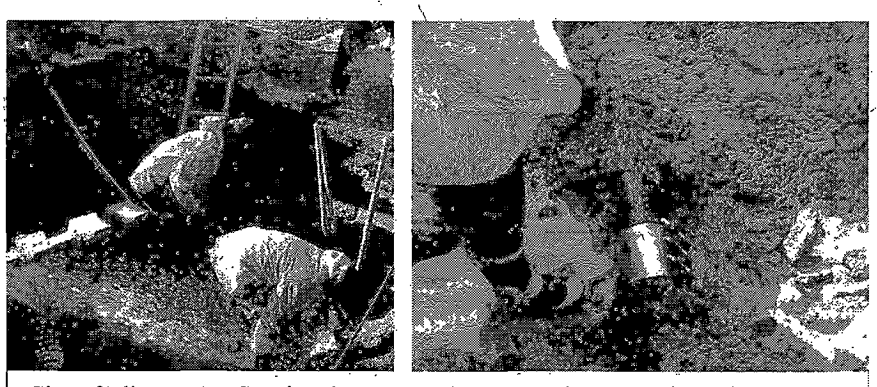
Free water filters have been made available to current Flint residents at several locations. The MDHHS and the Genesee County Community Action Resource Department (GCCARD) are providing Free National Sanitation Foundation certified water filters at the following locations.

Residents receiving MDHHS assistance are encouraged to visit either the **125 E. Union St.** or **4809 Clio Rd. MDHHS** office location to obtain a free, certified home water filter. Residents who are not currently enrolled in MDHHS assistance programs should visit the (GCCARD) offices located at **2727 Lippincott** and **601 N. Saginaw** in Flint.

Staff will be onsite at all four locations from **9 a.m. to 4 p.m., Monday through Friday**, to distribute filters and assist residents who have questions about proper installation.

3rd Quarter Work Accomplished

- Successfully completed the installation of Granulated Activated Carbon at the water treatment plant which reduced the TTHM level in the water and helped bring the City back into compliance with the Safe Drinking Water Act.
- Over 3000 new water meters were installed creating better accuracy, accountability, and decreasing the number of estimated reads on water & sewer bills.
- Evaluated over 8000 valves in the system and identified over 2300 that are currently inoperable. The repair of these valves will be budgeted and worked into our multi-year Capital Improvement Plan.
- Leak Detection on all 600 miles of the distribution system has started and is over halfway complete. Several dozen leaks have been identified and repairs continue as more leaks are found. This has decreased the amount of water loss existing in the system.
- Construction of a load out facility at our wastewater plant is on target for completion by November and will allow the City to eliminate the use of the incinerator resulting in significant annual savings.
- Hundreds of main breaks are repaired annually by City workers on top of construction projects and routine maintenance.



City of Flint Water Service Center employees work to contain and repair one of many main breaks that continues to occur as a part of an antiquated infrastructure system.

Hundreds of water main breaks occur annually and the City's skilled workforce is constantly faced with long hours and changing weather conditions in which they work. Hydrant flushing and hydrant winterization are also part of the system maintenance and often cause water discoloration. It is advised that you run your water for several minutes to allow discoloration to pass if work is being done in your area. The City is working to increase notification to residents when and where work is occurring.

Water Timeline

The following is a timeline of events, beginning with signing the KWA contract leading up to the current status of switching back to our previous source of water. This timeline only highlights certain notable events, for more information please visit the "water" page on the City of Flint website or email flintwater@cityof flint.com with your questions or to request a water test.

2013		
Date	**Event**	**Comments**
16-Apr	Flint signs contract with Karegnondi Water Authority (KWA).	Switch to KWA projected to provide water by mid-2016 and to result in over $200 million dollars in savings over time.
17-Apr	DWSD terminiates existing water contract	Termination effective 12 months from date of the notice.
Oct	Determination is made to use Flint River for interim period if construction can be completed.	Determination follows attempt at signing new contract with DWSD and evaluation of River option.
2014		
9-Apr	Flint recieves permit for use of the Flint River.	Permit is approved for interim use of Flint River which is expected to be just over two years.
30-Apr	Flint closes off the supply of water from DWSD	Valves were closed in the evening and monitored by Flint, GCDC, and DWSD.
Jul - Sept	Multiple boil water notices are issued in several areas of the City	Noticies are due to test samples showing that bacteria growth is possible. Hydrant flushing is unable to clear the environment and additional chlorine is introduced.
Nov	Development of Operational Evaluation Report (OER)	Recognition of high TTHM levels prompts a preemptive development of an OER which was submitted to the DEQ
16-Dec	Flint recieves TTHM violation notice ffrom DEQ	Violation is calculated from a running average of four quarterly test results
2015		
2-Feb	Flint offers free water testing	Letters are sent to residents who have voiced water concerns and free testing is expanded to all residents
10-Feb	Veolia Consultants hired	Violia responds to RFP for a water expert to make recommendations to reduce TTHM levels.
4-Mar	Flint holds first Technical Advisory Committee meeting	Formation of Advisory Committee comes out of Veolia recommendation and helped bring experts together to discuss options and solutions.
20-May	Flint holds second Technical Advisory Committee meeting	meeting is used to confirm that Flint plans to install the recommended Granulated Activated Carbon filters by August to combat TTHM
Aug	GAC filter installation complete	Filter installation completed on schedule and the TTHM drops significantly prior to quarterly testing
17-Aug	DEQ directs City to begin additional corrosion control	Corrosion control design moves forward with the City's engineering firm.
2-Sep	Flint recieves notice they have returned to compliance	DEQ sends notification that Flint is no longer in violation of the Safe Drinking water act.
2-Sep	Online report that Flint River water is very corrosive	Report is by a VA Tech research group led by Professor Marc Edwards after hundreds of samples were tested.
24-Sep	Medical Professionals report a rise in elevated blood lead level of children.	A group of Medical Profesional led by Dr. Mona Hanna-Attisha, announce the difference in blood lead levels
25-Sep	Flint issues a "Lead Advisory"	Following the medical information, Flint and the Genesee County Health Department issue a "Lead Advisory"
1-Oct	Public Health State of Emergency	County Commissioners and the Health Department declare a Health Emergency.
7-Oct	Flint Technical Advisory Committee recommends returning to former source of water	The Tech team includes EPA lead experts, Marc Edwards, DEQ representatives, engineerinng team, Medical Professionals, and City Officials.
8-Oct	Governor announces effort to return Flint to former water source	The City of Flint, Mott Foundation, and State of Michigan combine to raise funding for switch.

What Was Done Before The Switch To The Plant Ever?
(Verify at the Time)

Pre-Close
Plant was in standby mode for many years
had to show that were met standard

- in late 90's underwent upgrade

- Since early 2000's the plant was run
  Quarterly for about a week Product
  sent to waste except in 2 emergencies in 2007
    Emergency Repairs on Pipeline
      2 days 3 days for each
  - City moved Bill because could
    not test before subsequent
    testing showed water was Precautionary

- We do have Quarterly Analytical Results
  for last 10 years.

- Pre-Close
- We have Historical information in the form of trended & Raw Water
  Chemistries going back for a number of years
- Operational testing was done Quarterly for Approximately a week
  at a time each time
- The WTP demonstrated its ability to consistently meet the Requirements of the SDWA
  Effort under the Emergency Situation in 2007 this water was reused into the Distribution System

Blood Lead Levels in Flint Talking Points
November 18, 2015

Blood Lead Level Testing Results

- The Michigan Department of Health and Human Services is releasing a report regarding blood lead levels in Flint children and adults in zip codes 48501-48507.
- The purpose of the report is to inform residents about blood lead level testing efforts in Flint and provides cumulative total numbers.
- It is not intended to be a technical report but a technical description, and further analysis of the data in the report is underway.
- The data in the report include the total number of tests conducted and the total number of elevated blood lead levels ≥5µg/dL (micrograms per deciliter), broken down by date and age ranges.
    - Specifically, the current report breaks down the data by the 16 months prior to the switch in water source for Flint (January 1, 2013 through April 14, 2014), to the 17 months after the switch (April 15, 2014 through September 30, 2015), and after the lead exposure prevention campaign was initiated by the State in Flint October 1, 2015 to October 30, 2015. These numbers will continue to be updated.
    - The report also breaks down the number of tests and elevated blood lead levels by children younger than 6, children ages 6-17, and adults 18 years and older.
        - Lead exposure for children younger than 6 is of particular concern because they are more sensitive to the effects of lead and tend to absorb more than older children and adults.
- Data in the report includes both capillary and venous blood tests. People who have had multiple tests are counted only once.
- 963 people were tested in Flint between October 1, 2015, and October 30, 2015, 18 children 17 years of age or younger had elevated blood lead levels. Six adults over the age of 18 were identified with elevated blood lead levels during this time as well.
- With these testing results, MDHHS is working closely with the Genesee County Health Department to conduct case management to ensure that these families are receiving the follow up care they need - including additional blood testing and a home investigation to identify and help reduce the potential for additional lead exposure in their environment.

- In addition to this report, MDHHS has zip code level data available by quarter for 48503-48507 by request. Zip codes 48501-48502 do have some cases, but the numbers are too small to release by quarter.

Water Filters and Replacement Filters

- Our first action item is to work closely with our public and private partners to provide water filters to Flint residents and MDHHS clients.
- To meet this priority, the governor identified one million dollars in state funding to purchase water filters for Flint residents.
- The Brita SAFF-100 filters being distributed by the department and GCCARD do meet the NSF/ANSI 53 standards for drinking water treatment units.
- The Brita faucet filtration system we are distributing are National Sanitation Foundation certified to reduce lead in drinking water.
- Free water filters and replacement cartridges are available to current Michigan Department of Health and Human Services clients and Flint residents who are on the Flint water system at four locations:
    - Flint residents who are not current MDHHS clients should visit one of two Genesee County Community Action Resource Department offices to obtain a filter.
        - at 2727 Lippincott and 601 North Saginaw in Flint
    - Current MDHHS clients in the city of Flint should visit their local MDHHS office:
        - At 125 E. Union St. or 4809 Clio Road
- Staff will be onsite at all four locations from 9 a.m. to 4 p.m., Monday through Friday, to distribute filters and assist residents who have questions about proper installation.
- Given the questions and concerns regarding the change in water source in Flint, MDHHS authorized the use of emergency services funding to provide water filters for MDHHS clients receiving assistance in the city of Flint.
- This funding will support active Family Independence Program (FIP), Food Assistance Program (FAP), Child Development and Care (CDC), State Disability Assistance (SDA), State Disability Assistance (SDA), or Social Security Insurance (SSI) recipients so that they can obtain filters that are National Sanitation Foundation (NSF) certified to remove lead and ANSI Standard 53.
- MDHHS has also posted an instructional video on the MDHHS YouTube channel to help residents properly install water filters, and to demonstrate how to replace the original filter when it expires.
    - https://www.youtube.com/watch?v=plsOvmH 0
- MDHHS currently serves approximately 25,000 households in Flint.

Background Information

- Initial analysis of MDHHS data found that blood lead levels of children in Flint have followed an expected seasonal trend; due to small numbers further analysis was initiated.
- While this analysis of blood lead levels in Flint as a whole remains true, after a comprehensive and detailed review down to the zip code level, we have found that the state analysis is consistent with that presented by Hurley.
- Director Lyon is working closely with DEQ and the administration to take active steps to reduce all potential lead exposures in Flint and across the state.
- Our Chief Medical Executive has been in communication with the lead investigator at Hurley Children's Hospital, and we continue to work with Hurley, the city of Flint, local and state leaders to verify and analyze data trends.
- Zip code-level data does show that there has been an increase in elevated childhood blood lead levels in specific communities.
    - This does not conclusively mean that the water source change is the sole cause of the increase, but data does show an association.
    - There is an increased proportion of children with elevated blood levels in several zip codes, particularly 03 and 04. These appear to have increased over the last 1.5 years.
    - Lead exposure can occur from a number of different sources (such as paint, gasoline, solder, and consumer products) and through different pathways (such as air, food, water, dust, and soil).
    - Although there are several exposure sources, lead-based paint is still the most widespread and dangerous high-dose source of lead exposure for young children in the US and Michigan.
- We reviewed MDHHS statewide data using the same methodology used by Hurley, looking at our numbers by zip code and age ranges, and filtering out non-Flint children.
- Routine surveillance of blood lead levels does not analyze data down to the zip code level. Detailed analysis like this occurs when there is reason to focus in on precise locations or populations.
- MDHHS is working closely with the Michigan Department of Environmental Quality, Hurley Children's Hospital, the Genesee County Health Department, and community organizations to initiate further action steps.
- We understand that cost may be a barrier to following the recommendations for drinking water, which is why NSF-certified filters are being distributed to residents on the Flint water system free of charge.

- MDHHS is recommending that residents follow the Public Health Advisory issued by the Genesee County Health Department, as well as take further steps to reduce exposures to all forms of lead in and around their homes.

MDHHS Stats and Facts

- 'High Risk' Zip codes (48503 and 48504)
    - Blood lead level rates among children under six years of age in the high risk zip codes (48503, 48504) were 2.7 times higher than the rest of Genesee County before the switch to Flint River Water.
    - After the switch to Flint River Water, rates in the high risk Zip codes were 3.2 times that of the rest of Genesee County.
- Other Zip codes in Flint
    - Rates of elevated blood lead levels among children under six years of age in other parts of the city of Flint were 2 times that of the rest of Genesee County before the switch to Flint River Water.
    - The magnitude of the elevated rate remained roughly the same during the period after the water source switch.
- Lead abatement through MDHHS was federally funded up until FY14 when Michigan began providing additional funds to abate homes.
- In FY14, $1.25M General Fund was added. In FY15, General Fund was bumped up to $1.75M and FY16, General Fund remains at $1.75M.

Reducing and Removing Lead Exposure

- Use only cold filtered water from the tap for drinking, cooking, and making baby formula. Hot water is more likely to contain higher levels of lead. The lead in household water usually comes from the service line that connects your house to the water main or the plumbing in your house, not from the local water supply.
- In housing built before 1978, it can be assumed that the paint has lead unless tests show otherwise.
- Make sure your child does not have access to peeling paint or chewable surfaces painted with lead-based paint.
- Children and pregnant women should not be present in housing built before 1978 that is undergoing renovation. They should not participate in activities that disturb old paint or in cleaning up paint debris after work is completed.
- Create barriers between living/play areas and lead sources. Until environmental clean-up is completed, you should clean and isolate all sources of lead.

- Close and lock doors to keep children away from chipping or peeling paint on walls. You can also apply temporary barriers such as contact paper or duct tape, to cover holes in walls or to block children's access to other sources of lead.

- Regularly wash children's hands and toys. Hands and toys can become contaminated from household dust or exterior soil. Both can be lead sources.
- Regularly wet-mop floors and wet-wipe window components. Because household dust is a major source of lead, you should wet-mop floors and wet-wipe horizontal surfaces every 2-3 weeks.
    - Windowsills and wells can contain high levels of leaded dust. They should be kept clean. If feasible, windows should be kept shut to prevent abrasion of painted surfaces or opened from the top sash.
- Take off shoes when entering the house to prevent bringing lead-contaminated soil in from outside.
- Prevent children from playing in bare soil; if possible, provide them with sandboxes. Plant grass on areas of bare soil or cover the soil with grass seed, mulch, or wood chips, if possible.
    - Until the bare soil is covered, move play areas away from bare soil and away from the sides of the house. If you have a sandbox, cover the box when not in use to prevent cats from using it as a litter box. That will help protect children from exposure to animal waste.
- Avoid using makeup, containers, cookware, or tableware to store or cook foods or liquids that are not shown to be lead-free.
- Remove recalled toys and toy jewelry immediately from children.
- Shower and change clothes after finishing a task that involves working with lead-based products such as stained glass, making bullets, or using a firing range.

If possible, shower and change before returning home if your job requires you to work with or around lead. These jobs can include painting, plumbing, and some factory work.

WIC Children

- There are 855 infants participating in WIC in Flint.
- We are working with partners at the United Way to ensure that WIC families have access to water filters and bottled water.
- In homes with infants on WIC, if the household has documentation from an official source documenting unsanitary water supply issues, that family may be eligible to receive ready-to-feed formula. Families should contact WIC to see if they are eligible.
- Each household will be considered on an individual basis.
- WIC cannot cover bottled water.

Our comment regarding the Dec 28th taskforce report:
"As new Michigan Department of Environmental Quality leadership, we are committed to ensuring that the residents of Flint have safe, clean drinking water. During the early days of the incident, some departmental decision points were not effective - moving forward we are setting new higher standards for these decision points throughout the organization to ensure the protocols we use are appropriate for the situation. We are focused on working with the city, county, other state agencies on water testing in homes and schools and are committed to making this focus our priority until we know that the water is safe to drink."

Our comment regarding what DEQ is doing to help restore public trust:
"As new leadership within the organization, ensuring that residents have clean, safe drinking water is our foremost priority. We recognize and understand that Flint residents are frustrated by the incident and expect the Michigan DEQ to act swiftly to provide a solution to the situation. We are committed to working tirelessly to conduct water testing of residential homes and school buildings and are working in conjunction with our local and federal counterparts to ensure our water sampling and testing protocols are the most effective methods as possible now and into the future. We won't stop until our goal is met, to ensure that every resident has access to safe, clean water."

– Keith Creagh, Interim Director
Michigan Department of Environmental Quality

Drinking Water Lead & Copper Sampling Instructions

Dear Resident:

Thank you for helping to monitor for lead and copper in your drinking water. It is important that you follow these instructions so that we may collect an accurate measurement of the lead and copper in your drinking water. This sample is supposed to represent the water you would typically drink and the faucet from where you would drink the water. Call your water supply if you have any questions.

1. Select a faucet in the KITCHEN or BATHROOM that is commonly used for drinking. DO NOT sample from a laundry sink or a hose spigot as these samples cannot be used by your utility.

2. Wait at least 6 hours before collecting your sample but we do not recommend sampling if the faucet has sat idle for more than 12 hours.

3. Fill the sample bottle to the neck with the "first draw" of COLD water.

4. Please answer the following questions:

a) What date and time did you **fill the bottle**? Date _____ Time _____ A.M.

b) Which faucet did you use to fill the bottle? ☐ Kitchen ☐ Main Bathroom ☐ Other
If OTHER, please describe: _____

C) Is this faucet connected to a home treatment device such as a water softener, a reverse osmosis unit, an iron removal device OR is any kind of additive used in the home? ☐ Yes ☐ No
If YES, please describe: _____

Your Printed Name _____

Your Address _____

_____

Your Signature _____

5. Attach this form to the bottle and leave it outside your front door and call to arrange pick up.

If you have any questions about sampling call:

Water Supply: City of Flint

Manager or Water Operator: Brent Wright

Phone: (810) 787-6537

To schedule sample pick up call:

Wendy Braun: (810) 766-7135 ext. 2606

Thanks again for your help. Information on this year's lead and copper monitoring will be printed in the *Consumer Confidence Report* that will be made available to you by July 1 of next year. We will send you the results within 30 days of receiving them. Contact your utility if you have any questions.

Dear Resident,

The City of Flint Utility Division has recently amended our lead and copper testing procedure and are now using a NO-FLUSH protocol. The new method is designed to provide a more accurate gauge of the amount of lead exposure that may exist in the plumbing.

We are requesting that all residents who have had their water tested for lead and copper submit to another test so that we may provide you with a current report. The City has multiple methods available for you to arrange another water test, obtain a water filter, or a replacement cartridge:

1) Call the Water Treatment Plant at 810-787-6537
2) Call Our DPW Service Specialist at 810-766-7105 x 2606
3) Email flintwater@cityofflint.com
4) Come in to the INFORMATION window in the Lobby of City Hall

Bottles for water testing can be picked up at the Water Treatment Plant or at City Hall. You may also arrange for bottles to be delivered to your individual home or business. We ask that you please encourage other neighbors and residents to get their water tested as well by sharing this information with them.

Thank you,

Sincerely,

Mike Glasgow
Utilities Administrator
810-787-6537 x 3512

Howard Croft
Public Works Director
810-766-7346 x 2043

DRAFT

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

Backgrounder on City of Flint Water

After a change in the water source for Flint residents, there have been concerns related to the water quality, in particular lead in the water, and its impact of the community. As a result, Department of Health and Human Services (DHHS) and the Department of Environmental Quality (DEQ), working with local public health departments and the City of Flint (City), have put together an Action Plan to address public health concerns in the City.

While Flint water is meeting all state and federal drinking water standards, there is an increasing level of concern that the Flint River is not the best water source. The City's Technical Advisory Committee recommended the City switch back to DWSD. In addition, recent studies by Hurley Children's Hospital, and confirmed by DHHS, have indicated a rise in blood lead levels in some Flint children. Sample screening completed last week by the DEQ indicated that some Flint Public Schools have detectable lead levels in their water.

Action Plan:
Immediately, the City and State announced the following steps:

- Governor named Dr. Eden Wells as Flint Public Health Advisor
- Advisories issued recommending residents flush their cold water pipes before use, as well as only use water from the cold water tap for drinking, cooking and especially making baby formula.
- Schools are advised to not use the drinking water fountains and are using bottled water.
- Free filters are available to all households in Flint, along with replacement filters.
- Flint Public Schools were screened for lead exposure.

For the near term, the City and State are asking for/ doing the following:

- Switch the drinking water source from the Flint River to DWSD.
- Test and inspect all schools in Flint, including charter and parochial schools.
- Free water testing for all homes.
- Expand exposure testing to additional households in Flint.

For the long term health of all Flint residents, the City and State have committed to:

- Switching to the Karegnondi Water Authority in the summer of 2016 as the permanent water supply for the City of Flint
- Allow for Drinking Water Revolving Loan funds to be used to expedite the replacement of private residential lead service lines.
- Lead exposure campaigns for homes, schools and communities.

Budget Request:
To facilitate the action plan outlined above, the State is requesting $10.6 million ($8.2 million GF). The funding will address 4 priority areas:

1. Provision of filters for residential service ($2,016,000)

Filters will be provided to all Flint households, including replacement filters until the system is fully optimized. Each filter cost is $20.

2. 50% of the estimated cost to reconnect temporarily to the DWSD ($6,000,000)

The City has estimated it will cost an additional $1.3 million per month to use DWSD instead of the Flint River. The State and City have agreed to split the cost through July 2016 when the new Karegnondi Water Authority will be completed and Flint will switch to that water source.

3. Funding for testing water samples ($1,000,000)

New testing protocols for schools will require each faucet in the school be tested and evaluated at the State's lab. In addition, lead exposure testing in homes will result in thousands of additional samples that will need to be evaluated. Each sample cost $26 to process.

4. Lead exposure testing and inspections ($1,600,000)

DHHS, DEQ and LARA are pulling together a team to go into schools and high risk homes to test and evaluate lead exposure.

DEQ's 18 Point Partnering Plan

1. **After Action Plan (FAQ) will be ready by noon November 16, 2015**
   - First version complete – updated as needed

2011 LAW REPORT CONT PHOSPHATE W/ LINE ITEM

2. **School Test Data**
   - School reports to be expedited
   - Steve Busch creates summary reports
   - George Krisztian creates summary spreadsheet

BROWNELL

3. **Blood exposure**
   - DHHS is lead on providing data

4. **Meeting with Mayor Karen Weaver**

ASK MAYOR IF JOE & LIKE A FOLLOW UP MEETING WITH THE DIRECTOR

   - Harvey Hollins lead – Dan Wyant, Jim Sygo and George Krisztian to attend

5. **Messaging our Partnering Plan**
   - Provide ongoing public updates regarding Governor's 10 point plan
   - Continue emphasis on the availability of free testing for Flint residents
   - OEA to direct the Public to the "Flintwater" website

- HOW MANY HOUSES TESTED?
- 8 SCHOOLS TESTED

6. **Sampling Protocol**
   - Establish alignment with EPA Region 5 on sampling protocol

WAITING FOR COMMENT BACK FROM EPA

7. **Lead service line replacement**
   - Expand RLF directed at lead service line replacement
   - Amy Epkey, Maggie Pallone and Sonya Butler

ANANICH IS TAKING THE LEGISLATION UP

8. **Partner with EPA**
   - Jim Sygo → Bob Kaplan
   - Dan Wyant → Susan Hedman
   - Mike Prysby and Steve Busch → Darren Lytle and Mike Schock
   - George Krisztian → Tom Burke
   - ODWMA Staff → EPA Region 5 Staff (Jennifer Crooks and Tom Poy

NEED FOIA'ED EPA FOR # VIOLATIONS FOR THE ENTIRE COUNTRY

9. **Meet with Mott Foundation to discuss Lead Service Line Identification Study**

WAIT TILL MEETING MAYOR

10. **Lead Education Program**
    - DHHS is the lead on Lead Education Program

11. Moving KWA forward

ASK MAYOR TO SET UP MEETING

- Proactive meetings with KWA

12. Participate actively with Technical Advisory Council

13. Utilize Joan Rose and MSU water expertise

COMPLETE FOR NOW

14. Public Outreach

- Mayor Karen Weaver
- Genesee County Health Department
- Drs. Lawrence Reynolds, Eden Wells and Matthew Davis
- Ministers
- Land Bank
- Legislators
- Citizens

NEED TO MEET TO DISCUSS WHAT NEED TO BEEN DONE TO LIFT ISPN?

15. Outreach to schools

- EPA guidance on testing
- Work with state superintendent
- ODWMA Staff to work on Literature

DAN TO CONTACT SUPER

16. Make recommendations to EPA about LCR

17. Compliance Communication letter sent November 9, 2015

- Wait until after Dec 30th

18. Enhance Coordination with Health Officials regarding personal health notifications of drinking water issues.

RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
EXECUTIVE OFFICE
LANSING

BRIAN CALLEY
LT. GOVERNOR

December 15, 2015

Dear Flint Water Advisory Task Force Members:

Thank you for your correspondence on Dec. 7, and, most importantly, for your hard work to promote public health and protect our residents as we move forward. Your efforts are both respected and appreciated.

As acknowledged in your letter, we have taken many steps to address the challenges in Flint as they relate to reducing lead exposure. I am pleased to see the progress since October, and recognize there is more work that must be done to ensure that this progress continues.

At the state level, there has been a confluence of efforts between Departments of Environmental Quality and the Department of Health and Human Services to coordinate with the Genesee County Health Department, local schools, and our partners in the non-profit community.

These partners are making progress, and we know we must always strive to improve practices and communication for continual improvement.

You make a solid recommendation to establish a person who is independent of any one of the involved state agencies to serve as the point person to coordinate the ongoing work. I am recommending that Harvey Hollins, director of the Office of Urban Initiatives, carry out this effort. Harvey is well-versed in the issues and the challenges faced by our cities and will be effective in this role. Senior members of our executive team will continue to engage with your task force and provide direction and support to Harvey to ensure you will have continued support and cooperation. We also have retained Chris DeWitt, a veteran communications specialist, to strengthen community outreach efforts to make sure residents have access to the information they need.

I also support your suggestion of a dashboard to make information about our work and progress more accessible to the Flint community. These are critical measures that can be used as we look the challenges and progress in Flint, but also can be a part of efforts moving forward in other areas of our state. It's important that people have confidence that we are working to address any problems and will take the necessary actions to improve interaction among city, state and federal agencies. We also will continue to work with the medical community to consider how we can work together on wraparound needs of children who might experience health problems.

People in Flint and across our state deserve safe, clean water. I want them to be confident that the water coming out of their tap is safe for their families. And I want them to trust that their government – at all levels – is working effectively to protect them.

I thank you again for investing your time and expertise in this vitally important effort.

Sincerely,

Rick Snyder
Governor

The DEQ and the DLARA also have conducted sampling at other Flint SCHOOLS, and results will soon be available on the DEQ's website. Additionally, the state will test every other school in Flint Community Schools, as well as any charter or private school in the city. Interested schools should contact George Krisztian at krisztiang@michigan.gov.

Homeowner and other customer-requested testing results
Results from the # of homes, businesses, schools and other facilities that took advantage of free water testing through the state showed similar, localized results. More than 75 percent of the samples processed demonstrated lead results of less than 5 parts per billion, and more than # percent demonstrated lead results of less than 15 parts per billion.

In ZIP code #, data…

This data suggests that while some homes experience elevated lead level results due to lead service lines or in-home plumbing, many other homes experience little to no lead. This can make it difficult for homeowners and businesses to predict their lead exposure.

"The best thing residents concerned about lead in their home can do is get their water tested," said George. "Then George said something else here."

Testing is available for free by contacting the Flint Water Plant at 810-787-6537 and pressing 1, or by emailing flintwater@cityofflint.com.

For more information about water samples received through the state's free testing program, visit www.michigan.gov/flintwater.

How school sampling was conducted
To conduct this comprehensive sampling, the DEQ and Michigan Department of Licensing and Regulatory Affairs began on Oct. 23 with a thorough plumbing assessment of the school to gain a comprehensive understanding of how water moves through the building and what types of plumbing materials are used. The assessment also identified 31 faucets or fountains in the school that provide water for drinking, cooking and/or food preparation.

On Oct. 24, the DEQ and DLARA took four, 125-milliliter samples from each of the 31 identified faucets and fountains. The first two samples were taken immediately after turning on the faucet, followed by a 30-second flush and then the third sample, followed by a 2-minute flush and then the fourth sample. These samples provided information on the impact of any lead sources in or around each specific faucet and fountain as well as its connecting plumbing.

On Oct. 31, the DEQ and DLARA took an additional 10 samples from three sites in the school. These 1-liter samples were taken consecutively, and provided information about the impact of any lead sources deep in the building's plumbing.

Dear Governor:

The Flint Water Advisory Task Force (FWATF) recognizes and supports your recent efforts to both mobilize state emergency resources and secure similar federal emergency response resources to address the immediate water supply issues in Flint. We also acknowledge and support the initial steps outlined in your State of the State address to mitigate the long-term public health consequences of the lead exposure suffered by Flint residents.

The attached letter contains a series of recommended actions that outline the steps we believe necessary to re-establish a reliable, trusted potable water distribution system in Flint as soon as possible. Our recommendations include the need to involve staff experts versed in Lead and Copper Rule requirements, as well as other individuals and organizations that can, through their inclusion, help achieve the necessary public trust and credibility.

We also note that these recommendations are consistent with actions taken by the USEPA announced yesterday, January 21, 2016, although in some respects are more specific, detailed, and comprehensive.

We are also recommending actions to address the Legionella outbreak, including a recommendation to request the federal Centers for Disease Control and Prevention (CDC) for assistance in assessing this outbreak. Although current evaluation suggests--but has not established--a link in the outbreak of Legionella with the switch in drinking water supply, it is critically important to do whatever is necessary to engage the proper expertise in order to make a clear determination as to the routes of transmission.

We recognize that you may have already initiated some of the recommendations contained in our letter. As noted earlier, these recommendations are also consistent with recent USEPA actions taken to address the situation in Flint, although more specific.

We thank you for your positive response to our past recommendations and are confident that you will respond to these recommendations in the same manner.

Respectfully,

Matt Davis, M.D.
Chris Kolb
Lawrence Reynolds, M.D.
Eric Rothstein, CPA
Ken Sikkema
--

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Draft
Q+A

Background –

Prior to switching from DWSD, the city of Flint operated a water treatment plant as a standby, backup emergency plant for purposes of reliability in the event that the single pipeline from DWSD failed.

In 2009, the water treatment plant was operated in this emergency capacity in two instances (dates/number of days). As a backup emergency plant, the city was required to operate the plant quarterly to demonstrate the ability to produce safe water in accordance with Act 399 and to keep mechanical equipment in good working order, such as valves, rubber seals, etc. Each time the plant was test run quarterly, samples were taken of raw water quality (describe here) and of finished water (post-filters). Treated water was not put into the distribution system during these test runs, but rather was discharged to the river in accordance with a NPDES Permit (confirm with Steve). The test runs were for demonstration purposes only and to keep the plant operational and staff familiar with operation in the event it was needed in an emergency.

Do we want to note that the original decision was to join KWA and begin receiving water in ~3 years from Lake Huron? It wasn't until DWSD issued a termination notice that caused the city to consider relying on the Flint River in the interim because they could not agree on a contract extension with Detroit.

April 2014: Flint terminates service from DWSD and begins using their water treatment plant full time.

What approvals from DEQ were required to do this?

Because Flint had long ago been issued construction permits for raw water pumps to withdraw water from the Flint River, the city was grandfathered under the Water Withdrawal program as were all existing community public water systems. There were no additional DEQ permissions required.

Under Act 399, Michigan's Safe Drinking Water Act, there are no licenses or permits required to operate. Two construction permits were issues prior to the treatment plant changing from an emergency back-up plant to a full time operation. These permits were for small changes such as new chemical feed equipment, changes to the electrical service, etc.

Summer 2014: Flint experiences several (how many?) water main breaks and has 2 localized (describe) boil water events.

Do we mention the unusually harsh winter that led to an increased number of water main breaks throughout Michigan that year?

Is it unusual for a city to issue boil water advisories? Should the state have been concerned at this point?

During the summer, the city was actively repairing the distribution system. After the switch to the Flint River, it was discovered that there were (how many) broken or closed valves in the city's distribution system. As the city began correcting this problem they did experience issues of bacteria in the distribution system as a result of the repairs.

This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

Complaints are being made that there are taste, odor, and color issues since the switch from DWSD; including rashes and hair falling out. Why didn't the state do something?

DEQ consulted with the city regarding these complaints. The city indicated that they were offering testing for anyone that had issues and that they were not able to verify the complaints. Jugs of discolored water were being brought to meetings, but city personnel were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHM's, it was anticipated that there would be short term disturbances in the system that would cause color and taste complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) can and will cause temporary problems as described. Based on information from the city personnel, it appeared that the complaints were related to operational activities occurring in the distribution system.

Late Summer 2014: Monitoring for TTHM's in the distribution system identifies that the city has elevated levels and will violate the MCL for TTHM's in subsequent monitoring.

How was this handled? Should this have been a sign that it was a mistake to allow Flint to switch from DWSD to the Flint River?

Because the water treatment plant was originally upgraded for intermittent, emergency use, it was not possible to predict Disinfection Byproduct formation until the city began relying on it continuously. The Flint River had higher levels of organic material and it was not a surprise that the water produced by the city of Flint developed higher disinfection by-products. TTHMs and HAA5s are the result of organic material in the water reacting with the disinfectant. On more than one occasion, DEQ district supervisors and engineers have indicated that continuous use of the Flint River poses an increased microbial risk and an increased risk of disinfection byproducts; will trigger additional regulatory requirements for monitoring; and require significant enhancements at the Flint Water Treatment Plant.

System at Stroudt rd.

In preparation to rely on the Flint River, the city installed ozone to help reduce the organic material (known as precursors), but additional measures were necessary. Because TTHM and HAA5 MCLs are calculated based on a running annual average at a specific location, the city didn't actually violate the safe drinking water act standard until the fall, but because it was apparent in the summer of 2014 that the standard would eventually be exceeded, the city was asked to proactively implement measures to address the problem before the violation required them to do so. The city added granular activated carbon to their filters (after receiving a construction permit from DEQ on date?) and levels of TTHMs and HAA5s were reduced. The city returned to compliance with the running annual average (MCL) on (date?).

What is the role of DEQ as a regulatory agency implementing the Michigan Safe Drinking Water Act?

What is the role of the City of Flint in water system operation and providing safe drinking water?

Issues around lead/copper:

Why didn't DEQ require a corrosion control plan from the city prior to bringing the water treatment plant on-line in April 2014?

DEQ believed there were two ways under the lead/copper rule to deem a water supply as providing "optimal corrosion control", either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment. DEQ staff thought it was appropriate to call for the city of Flint to perform two 6-month rounds of monitoring to demonstrate if the city was practicing optimal corrosion control treatment. According to state regulations (R325.604f (2) (iii), a system can demonstrate that it is "practicing optimal corrosion control" by sampling in two consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the Flint River has 0 ppb lead, the city would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods.

In addition, the city of Flint had been purchasing water from DWSD that was treated for corrosion control. It was DWSD that was considered as having optimized corrosion control at that point. Since the city of Flint had not been the supplier of water before, DEQ did not require the city to "maintain" corrosion control for which it was not responsible. It couldn't "maintain" something that it wasn't doing. As we stated previously, we believed Flint should have been afforded the same opportunity that all other large water systems were initially granted to demonstrate optimal corrosion control treatment through full scale monitoring. For these reasons, two 6-month rounds of monitoring, as required by the lead/copper rule were felt to be appropriate to determine whether or not optimal corrosion control was being achieved.

The first round of monitoring conducted July 2014 through December 2014 resulted in a 90th percentile of 6 ppb lead. Why didn't the DEQ require the city take actions at this point?

A 90th percentile lead/copper result of 6 ppb for lead is not unusual. Many water supplies in Michigan and across the country have 90th percentile levels of lead greater than this. Even systems that have installed treatment and are considered optimized by definition can and do have levels above 5 ppb.

In February, EPA staff inquired about corrosion control and whether the city was providing treatment to control corrosion. What was the DEQ's response?

DEQ indicated that they city was in compliance with the lead/copper rule. 90th percentile levels were below the Action Level and not unusual. The city was already conducting the second round of monitoring which would provide for a determination of whether or not additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the lead/copper rule that

lead or copper results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile action level in the rule.

An e-mail from Steve Busch indicated that the city was practicing corrosion control. Why was this said?

This was a misstatement. What was meant was that the city was performing the required monitoring to determine whether or not they were "practicing optimal corrosion control". It was clarified in follow-up telephone conversations with EPA.

In April, EPA staff visited Flint and sampled a residence at 212 Browning. High levels of lead were present. Why wasn't this seen as a potential system-wide problem?

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The reason for this connection is unknown. The city replaced the lead service line. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem. There was also no reason to believe that this matter was anything other than a site specific condition. (may not be so unique in terms of Pb levels)

A draft memo, dated June 24, 2015, from an EPA staff person claimed that DEQ had inappropriately handled the sampling at the city and that corrosion control should have been required before start up. What is DEQ's response to these allegations?

DEQ never received this memo and it is our understanding that EPA never sent us this memo. A copy of the draft document was downloaded from the ACLU website. On June 30th, an e-mail was received from EPA that indicated it was a draft memo that had been shared with the homeowner where sampling occurred and that once management had a chance to review the memo they would provide a final copy to DEQ. A final copy was never received. Also, EPA indicated in this same e-mail that a conference call to discuss the issues raised in the memo was scheduled for July 21st between the agencies.

During the July 21st call, EPA provided a rule citation (for the first time) indicating that ..... DEQ provided their interpretation of the lead/copper rule. EPA indicated that they would consult with their attorneys and seek a clarification regarding the two different interpretations. To date (October 20th), DEQ has not received any feedback from EPA regarding the state's interpretation. Nov 2

There is on-going criticism that the DEQ provides inappropriate guidance to water supplies regarding pre-flushing of taps prior to lead/copper sampling? Explain DEQ's rationale for doing this.

The lead/copper sampling protocol is designed to standardize sample collection and is not the same protocol that would be used for an exposure assessment. Different sampling is done for different purposes.

Under the lead/copper rule, samples collected must be "first-draw" 1 liter samples collected from kitchen or bathroom taps at EPA designated, high-risk locations after

overnight stagnation. It is recognized that this may or may not be the highest level of lead that could be found at a residence. However, it does provide the water supplier with information about efficacy of their treatment process and an indication of how the water may be reacting with plumbing in the system.

The lead/copper rule is the only rule that requires compliance monitoring to be performed by homeowners. In order to simplify the instructions and ensure consistent sampling protocol and results, DEQ recommends that a sample tap/outlet be run the night before it is going to be sampled so that the sampling location is representative of a tap experiencing typical household use (as required by the lead/copper rule). Historically, there were problems with homeowners sampling from locations that had not been used for days, weeks or even months. The recommended/required stagnation period under the lead/copper rule is 6 to 18 hours. To accomplish this across the board, DEQ policy is to recommend that the tap be used or use be simulated on the night before it is going to be sampled. EPA has incorporated similar sampling protocols into tap sampling programs at schools and day care centers. (do we want to provide a footnote with a citation to the Milwaukee Westtown CARE Project?)

If there is a lead service line in the house, then a first draw sample under this condition will not contain water that has sat stagnant for some time in that service line. However, flushing the tap the night before will not likely result in capturing a first draw sample that has sat stagnant in that lead service line because only the tap that is going to be sampled is required to be stagnant. If there is a toilet or a dishwasher nearby, they can still be used. And it is impossible to predict whether there is water in that particular line that has spent any time at all resting quietly for any period of time in the service line and only happens to be poised for withdrawal at that particular tap at that particular moment. Only a site specific evaluation of a household plumbing system along with a site specific calculation of the volume of water in the plumbing system and the volume of water in the lead service line would potentially provide for a sample that has rested in the service line assuming that no water has been used in the house during the entire time of "resting". This level of complexity is not a practical approach for a community to employ or for water systems across the country to accomplish when they must rely upon homeowners to collect samples. The lead/copper rule is imperfect. But the instructions provided by DEQ provide for a consistent sampling protocol that is easily followed by homeowners and results in samples collected that meet the legal requirements of the lead/copper rule and the intention of providing water quality information upon which further regulatory decisions should be made. The lead/copper rule is intended to assist water suppliers with evaluating their treatment process and the effects of the water on plumbing systems. It is not a tool to assess individual exposure.

After the July 21st call with EPA where they provided a regulatory citation and their opinion that the DEQ had not followed the required protocol to require treatment, what steps were taken by DEQ to address the situation?

By the time the July 21st call occurred, the city had completed their two 6-month rounds of lead/copper monitoring. This monitoring showed that the city needed to install corrosion control measures. On August 17th, the DEQ wrote the city requiring the city to perform a study and install corrosion control treatment in accordance with the safe drinking water act. We also recommended Flint significantly accelerate this action and not take the time allotted by the regulations for selecting and installing OCCT.

When DEQ met with city residents on August 4th, they were still saying that the water was safe even after the sampling was done and it showed that corrosion control was necessary. Why the contradiction?

At the time of this meeting, all sampling results to date indicated that lead levels were within typical ranges seen in other water systems and below the Action Level established in the rule. It was acknowledged that the results showed that the city of Flint needed to provide optimal corrosion control treatment and that would soon be required. In addition, data provided by our colleagues at the Department of Health and Human Services indicated that there was no significant change in children's blood lead levels within the city. The evaluation showed that blood lead levels were following historical seasonal patterns and there was no indication of a water contributing to an increase. This provided backup confirmation (at that time) that the path followed was correct.

When the V-T researcher raised the alarm on (date) that the sampling required by DEQ was wrong and that levels of lead in the city were much higher than previously thought, why didn't DEQ investigate these claims and follow up on this information?

DEQ was informed in late August that a study was underway in the city and that samples taken appeared to be much higher than those taken under the lead/copper rule. Since we were not provided information regarding protocols used for the study, the DEQ could not adequately comment on the comparison between the two data sets. It was not however, unexpected that a different sampling protocol could yield higher results. Since the required two 6-month rounds of monitoring had already been completed at this point and the city had been notified of the requirement to install treatment, there were no additional actions deemed necessary by the agency at this point. The city had not exceeded the lead action level, they were actively pursuing treatment on an accelerated schedule, and DHHS information regarding blood lead levels in the city indicated that there was NO significant change since the switch.

Why did DEQ change their position in September and agree that lead is a problem in Flint?

As soon as the DHHS Chief Medical Officer determined that there was a correlation between blood lead levels in children in certain zip codes and the switch to the Flint River, DEQ responded. Actions were taken within a week to address the concerns raised.

Why is DEQ admitting it made a mistake?

If EPA's interpretation is correct and the city of Flint was required to maintain corrosion control and should not have been allowed to switch sources without maintaining corrosion control, this wasn't done. All indications are that the protective coating that was in place as a result of treated water received from DWSD has been eroded and that lead leaching has increased during the time that there hasn't been treatment. This was the mistake. However, DEQ staff acted in good faith. They believed that they were implementing the lead/copper rule appropriately with all of its nuances in sampling and limitation on compliance monitoring. The lead/copper rule establishes a mechanism for a new supply (when not previously serving water to the public) to conduct two 6-month rounds of monitoring to determine whether or not the supply can be deemed optimal by definition or whether treatment must be installed. It did not anticipate a system serving

greater than 50,000 residents would disconnect from a regional supply to become its own supply with a new source and different treatment methods. It was these circumstances for which DEQ employees were sincerely applying regulations as they interpreted them to ensure compliance and public health protection.

Why was Flint required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of the Michigan Safe Drinking Water Act (Act 399, PA 1976, as amended).

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples Flint was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census (*check with Steve*), which listed the city's population as more 100,000 residents. In March of 2015, the city provided an updated census that indicated the city's population had decreased to less than 100,000 (*check with Steve*). Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

Why were some sample results submitted by the City of Flint during the latest monitoring period excluded from the 90th percentile compliance calculation?

Compliance samples must be 1 liter in volume and be a first draw 1-liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted sampling sites, called tier 1 sampling sites. For a municipality such as the City of Flint, the tier 1 sampling pool must consist of single family structures that are:

- served by a lead service line,
- contain lead pipes, or
- contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

Furthermore, if a community has tier 1 sites that contain lead services, they are required to have at least 50% of their compliance samples collected from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters,

etc. One of the samples submitted by Flint that was excluded from the 90th percentile compliance calculation in the latest monitoring period was taken from a tap at a non-residential site, and the other sample result that was removed was collected from a single family home that has point of use treatment (*check with Steve*). Both of these sites are therefore statutorily excluded from the compliance consideration. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point of use or point of entry treatment can only be used if the community has insufficient tier 1 sites available.

Although we already addressed the issue of why we did what we did in the first question after the "Issues around lead/copper," the following citation and explanation may be useful if needed to answer additional questions or ones we haven't yet asked.

Rule 325.1064(f) (2) (D) (iii) says, "A water supply is considered to have optimized corrosion control if it submits results of tap water monitoring conducted under R 325.10710a and source water monitoring conducted under R 325.10710c that demonstrates, for 2 consecutive 6-month monitoring periods, that the difference between the ninetieth percentile tap water lead level computed under subrule (5)(c0) of the rule and the highest source water lead concentration is less than the practical quantification level (PQL) for lead. *(This is the procedure we were applying to Flint as they became a supplier and not just a consecutive system receiving finished water)* In addition, all of the following provisions apply:

(A) A supply whose highest source water lead level is below the method detection limit is considered to have optimized corrosion control under this paragraph if the supply's ninetieth percentile tap water lead level is less than or equal to the PQL for lead (which is 5 ppb) for 2 consecutive 6-month monitoring periods.

(B) A water supply considered to have optimized corrosion control under this paragraph shall continue monitoring for lead and copper at the tap not less frequently than once every 3 calendar years using the reduced number of sites specified in R 325.10710a(3) and collecting the samples at times and locations specified in R325.10710a(4)(d)(iv).

(C) A water supply is considered to have optimized corrosion control under this subdivision shall notify the department, in writing, under R325.10710d(a)(iii) of an upcoming long-term change in treatment or addition of a new source as described in that subdivision. The department shall review and approve the addition of a new source or long-term change in water treatment before it is implemented by the water supply. The department may require the supply to conduct additional monitoring or to take other action the department considers appropriate consistent with the requirements of R325.10604f(2) to ensure the supply maintains minimal levels of corrosion in the distribution system.

(D) & (E)……(lots more but not germane to the discussion)

Subparagraph (C) raises the issue of why Flint's change in source and treatment did not trigger additional department actions. One explanation has to do with whether the City of Flint was *"considered to have optimized corrosion control."* ODWMA staff did not consider Flint or any of the almost 300 other consecutive, customer water systems in Michigan that only receive and distribute finished water to be responsible for corrosion control treatment. It has been our practice to consider treatment of water to be the responsibility of the wholesale supplier, in this case DWSD. Therefore, this rule was not

considered applicable. ~~Another explanation is that~~ Flint already had authority to use the Flint River based on historic permits and periodic emergency use, so the city was not required to seek DEQ approval for a "new" source. And like every other large water system that initially came under the jurisdiction of the lead and copper rules, we were applying the overall procedure described in the ~~above paragraph~~ above subparagraphs (A) through (E) that allowed a system to demonstrate whether their current treatment methods were already deemed optimal. When the LCR was first implemented, numerous systems exceeded the lead action level of 15 ppb and wholesale suppliers had to optimize the corrosion control treatment. Under the regulatory framework allowed, some systems went 4 or more years before they had optimized their corrosion control, and in some cases, it took longer for it to take full effect in all of the consecutive customer supplies.

DRAFT

Prysby, Mike (DEQ)

From:	Howard Croft <hcroft@cityofflint.com>
Sent:	Monday, October 05, 2015 2:54 PM
To:	Amy Hovey; Andy Leavitt; Brent Wright; Darren Lytle; Dayne Walling; donna. cole; edwardsm; Gerald (Jed) Natzke; Howard Croft; James Henry; Jamie Gaskin; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Michael Glasgow; Michael Wright; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Norb Birchmeier; Pete Levine; Robert Bincsik; rosejo@msu.edu; Russell Hudson; Samir Matta; schock.michael@epa.gov; Sean Kammer; Busch, Stephen (DEQ); Warren Green
Subject:	Technical Advisory Meeting

All,

I am confirming that our Technical Advisory Meeting will be this Wednesday October 7th at 2:00 - 4:30 pm at City Hall.

The meeting will discuss the emergence of the lead concerns and we will have up to date discussion around the immediate response of filter distribution.

There will be expert discussion about corrosion control, the DWSD option, how the long term solution of line replacement would unfold, and details on the status of KWA. The agenda will be distributed at the meeting.

We look forward to everyone's attendance, please email me with any questions.

--

Howard Croft
Public Works Director
City of Flint
1101 S. Saginaw Street
Flint, MI 48502
PH# 810.766.7135 Ext.2043
hcroft@cityofflint.com

ANALYTE	RESULT	Sample Number	Address	Zip Code	Sample Description
Lead	0.001	LF85605	705 GARLAND ST	48503	KITCHEN
Lead	0.001	LF85608	125 E UNION ST/#1	48502	KITCHEN
Lead	0.001	LF85800	418 W PULASKI	48505	KITCHEN
Lead	0.001	LF85934	819 KENSINGTON	48503	KITCHEN
Lead	0.001	LF85937	3705 WHITTIER AVE	48506	KITCHEN
Lead	0.001	LF85939	4219 GREENLAWN DR	48504	KITCHEN
Lead	0.001	LF85942	533 MACDONALD	48507	KITCHEN
Lead	0.001	LF85951	1005 KENSINGTON AVE	48503	KITCHEN
Lead	0.001	LF85959	736 WALDMAN	48507	KITCHEN
Lead	0.002	LF85291	3513 BENNETT AVE	48506	KITCHEN
Lead	0.002	LF85601	704 GARLAND ST	48503	KITCHEN
Lead	0.002	LF85606	2607 WALTER ST	48504	KITCHEN
Lead	0.002	LF85610	401 BURROUGHS AVE	48507	KITCHEN
Lead	0.002	LF85612	1939 LAUREL OAK DR	48507	KITCHEN
Lead	0.002	LF85795	2426 BASSETT PL	48504	KITCHEN
Lead	0.002	LF85858	2708 CRESTWOOD DR	48503	KITCHEN
Lead	0.002	LF85861	4214 KELLAR AVE	48504	BATHROOM
Lead	0.002	LF85932	612 E 3RD ST APT #3	48503	KITCHEN
Lead	0.002	LF85946	G3139 HOGARTH #2	48532	SCHOOL DRINKING
Lead	0.002	LF85950	927 KENSINGTON AVE #2	48503	KITCHEN
Lead	0.002	LF85958	540 S SAGINAW ST	48502	KITCHEN
Lead	0.003	LF85285	3216 HAWTHORNE DR	48503	BATHROOM
Lead	0.003	LF85288	926 MAXINE ST	48503	KITCHEN
Lead	0.003	LF85614	528 S LYNCH ST	48503	KITCHEN
Lead	0.003	LF85857	1206 WILLOW ST	48503	KITCHEN
Lead	0.003	LF85930	2207 HILLS ST	48503	KITCHEN
Lead	0.003	LF85938	3014 BEGOLE ST	48504	BATHROOM
Lead	0.003	LF85952	1002 KENSINGTON AVE APT #1	48503	KITCHEN
Lead	0.004	LF85603	605 GARLAND ST/1	48503	KITCHEN
Lead	0.004	LF85609	125 E UNION ST #6	48502	KITCHEN
Lead	0.004	LF85615	2717 CONCORD ST	48504	KITCHEN
Lead	0.004	LF85944	932 KENSINGTON AVE	48503	KITCHEN
Lead	0.004	LF85953	1006 KENSINGTON AVE	48503	KITCHEN
Lead	0.005	LF85856	1308 WALNUT	48503	KITCHEN
Lead	0.005	LF85863	904 E 7TH ST	48503	KITCHEN
Lead	0.005	LF85943	1210 KENSINGTON	48503	KITCHEN
Lead	0.006	LF85290	1213 BEARD ST	48503	KITCHEN
Lead	0.006	LF85602	218 UNIVERSITY AVE	48503	KITCHEN
Lead	0.006	LF85801	1126 WOODSIDE DR	48503	KITCHEN
Lead	0.006	LF85859	2721 COVENTRY CT	48503	KITCHEN
Lead	0.007	LF85798	2430 BASSETT PL	48504	BATHROOM

Lead	0.007	LF85940	602 W STEWART	48505	KITCHEN
Lead	0.007	LF85955	1319 BEARD ST	48503	KITCHEN
Lead	0.008	LF85286	841 DICKINSON ST	48504	KITCHEN
Lead	0.009	LF85949	927 KENSINGTON AVE	48503	BATHROOM
Lead	0.009	LF85956	1205 BLANCHARD	48503	KITCHEN
Lead	0.010	LF85289	1426 MAPLEWOOD AVE	48506	KITCHEN
Lead	0.010	LF85941	1329 WASHINGTON	48503	KITCHEN
Lead	0.011	LF85929	3120 NORWOOD DR	48503	BATHROOM
Lead	0.012	LF85607	UNKNOWN		
Lead	0.013	LF85287	440 E ATHERTON	48507	KITCHEN
Lead	0.018	LF85935	2708 CRESTWOOD DR	48503	KITCHEN
Lead	0.019	LF85329	ST JOHN VIANNEY CATHOLIC SCHOOL		KITCHEN
Lead	0.030	LF85948	1210 WALKER ST	48503	KITCHEN
Lead	0.041	LF85860	2319 BAGLEY	48504	KITCHEN
Lead	0.075	LF85611	224 FOURTH ST	48503	KITCHEN
Lead	Not detected	LF85330	1505 W COURT ST/POWERS CATHOLIC SCH	48503	KITCHEN PREP SINK
Lead	Not detected	LF85604	605 GARLAND ST/2	48503	DRINKING FOUNTAIN
Lead	Not detected	LF85613	4307 OGEMA AVE	48507	KITCHEN
Lead	Not detected	LF85796	2422 BASSETT PLACE	48504	KITCHEN
Lead	Not detected	LF85797	3729 WOODROW AVE	48506	KITCHEN
Lead	Not detected	LF85799	3617 CHURCHILL AVE	48506	KITCHEN
Lead	Not detected	LF85802	1222 INGLESIDE AVE	48507	KITCHEN
Lead	Not detected	LF85862	605 CHANDLER	48503	KITCHEN
Lead	Not detected	LF85931	1359 DONALDSON #2	48504	BATHROOM
Lead	Not detected	LF85933	3701 N AVERILL AVE	48506	KITCHEN
Lead	Not detected	LF85936	1359 DONALDSON ST	48504	KITCHEN
Lead	Not detected	LF85945	G3139 HOGARTH AVE #1	48532	DUCK DRINKING FOUNTAIN
Lead	Not detected	LF85947	G3139 HOGARTH AVE	48532	KITCHEN
Lead	Not detected	LF85954	23009 PIERCE ST #2	48503	REFRIDGERATOR
Lead	Not detected	LF85957	1001 KENSINGTON AVE	48503	KITCHEN
Lead	Not detected	LF85960	2309 PIERCE ST	48503	KITCHEN

The Michigan department of environmental quality today announced water test results for Freeman Elementary School, as well as homes and businesses in Flint who have taken advantage of free testing from the state.

The unprecedented look at schools is part of the state's work to implement Governor Snyder's action plan for Flint Drinking water.

In late October, Thirty-one faucets and drinking fountains were tested at Freeman Elementary school. Twenty-two of the sites registered no detection for lead. Nine of the thirty-one tests contained elevated lead levels on initial sampling, according to DEQ testing.

"This actually is good news, because it suggests the detected lead issues are localized to few fixtures within the building rather than a system-wide issue," said George. "When we ran the taps at these nine sites for just a couple minutes, lead results dropped quickly to safe levels."

The state review suggests Freeman Elementary has several options to address the issue.



- Don't use or disconnect the nine fixture points
- Run the fixtures for 3 to 4 minutes each morning to flush any lead in the water
- Replace the affected faucets and fixtures

The DEQ has also tested more than 300 samples provided by homeowners and businesses in the city of Flint since the beginning of October. More than 90 percent of those samples showed lead levels below 11 parts per billion. High samples mostly appear to be associated with lead home service lines, or fixtures in older homes.

"The household data is consistent with our findings in the schools," George said. "If you have lead elements in your home plumbing, you should be aware of it and consider ways to address it. But the first step to becoming 'lead aware' is to take advantage of free testing."

Contact the Flint Water Treatment Plant for details on how to get your water tested.

--(On Screen graphic showing the contact info for the water treatment plant)—

To request water testing at a school please contact ...

--(George's email on screen)--

STATE OF MICHIGAN
EXECUTIVE OFFICE
LANSING

RICK SNYDER
GOVERNOR

BRIAN CALLEY
LT. GOVERNOR

CONTACTS:	FOR IMMEDIATE RELEASE
Sara Wurfel or Dave Murray Governor's Office: 517-335-6397 Brad Wurfel, 517-284-6713 Department of Environmental Quality Jennifer Eisner, 517-230-9804 Department of Health and Human Services Kathryn Thomas, 810-766-1734 Mott Foundation Jason Lorenz, 810-237-2039 City of Flint	Thursday, Oct. 8, 2015

Gov. Rick Snyder: Move back to Detroit water provides best protection for public health in Flint

State, city, Mott Foundation, join to fund switch until KWA is ready

FLINT, Mich. – Flint families and children will be better protected by reconnecting with the Great Lakes Water Authority as the source of the city's drinking water until the Karegnondi Water Authority pipeline is completed, Gov. Rick Snyder said.

Snyder said Thursday that he will request the state Legislature to provide half, or $6 million, of the $12 million needed to reconnect with the authority through next summer, when the KWA is expected to be completed. The Flint city government will provide $2 million and the Charles Stewart Mott Foundation has committed $4 million.

"All Flint residents need clean, safe drinking water," Snyder said. "The technical experts helping the city on its water advisory all agree this move back to the Great Lakes Water Authority provides the best public health protection for children and families. This effort today is the result of people coming together to solve a problem. I appreciate Detroit's willingness to reconnect with Flint, the Mott Foundation's generous commitment, and the dedication of all parties to come together to protect Flint families and children."

Flint city leaders requested the state's help to fund the reconnection and to assist with health and infrastructure issues. Flint's move to the Great Lakes Water Authority is expected to cost about $1.3 million per month until the Karegnondi Water Authority is completed next summer.

"It's heartening to know so many people are working at so many levels to bring safe, clean water back to Flint," Mott Foundation President Ridgway White said. "We believe this transitional solution is the right and necessary thing to do, and we're glad we could help the state and the city make it happen."

The move to Detroit water, which is expected to carry, carries many public health benefits. As large bodies of water, the Great Lakes are naturally prone to fewer problems from large rain events and other runoff issues that can sometimes be present in shallower rivers. Additionally, the Great Lakes Water Authority water already has additional corrosion control, using phosphates to help coat the insides of pipes and limit lead from leaching into the water.

However, reconnecting with the authority will not completely resolve the city's problem with lead service lines or aging infrastructure. It will take time for pipes in Flint to become coated with the phosphate corrosion control. Additionally, some households in the city could experience lead in their drinking water until all lead pipes and plumbing are replaced.

"Reconnecting to Detroit is the fastest way to deliver clean, safe water to Flint and stabilize the infrastructure system," Flint Mayor Dayne Walling said. "I appreciate the state, the Mott Foundation, Detroit, and the county's participation in a solution for Flint's water problems. The health and safety of Flint's families, children and seniors is my top priority, and reconnecting to Detroit is a major step that the city could not take alone given budget constraints."

To best protect public health, Snyder said state and local authorities will continue to carry out steps outlined on Oct. 2 in a comprehensive action plan, including continued testing, the use of faucet filters and providing residents with accurate information about steps to eliminate lead exposure. The Michigan Departments of Environmental Quality and Health and Human Services today also committed an additional $3.5 million for water filters, free lead testing through the state laboratory for Flint water customers, and hiring additional staff to conduct health exposure monitoring for lead in drinking water.

Free filters are available for current MDHHS clients at the 125 E. Union St. or 4809 Clio Road MDHHS office locations. For residents who are not currently enrolled in MDHHS assistance programs, free filters are available at the Genesee County Community Action Resource Department offices at 2727 Lippincott and 601 North Saginaw in Flint. Staff will be at all four locations from 9 a.m. to 4 p.m., Monday through Friday, to distribute filters and assist residents who have questions about proper installation. At the Lippincott location only, extended hours will be offered this weekend, including until 7 p.m. on Thursday and Friday and from 10 a.m. to 2 p.m. on Saturday.

Other good practices for residents concerned about lead include turning on the cold water tap and running the water until it's as cold as it will go. Additionally, only use cold water for cooking, drinking and especially mixing baby formula.

School test results released; more investigation planned

The state today also released the first results from its lead screening program in schools and homes. Of 37 total samples taken at 13 buildings, four samples spread over three buildings exceeded the federal action level of 15 parts per billion.

However, this sampling provides only an initial screen, and the state is committing to further testing water and inspecting plumbing at these schools. Until testing is complete, schools are advised to continue using bottled water and filtration as a precaution to protect children.

In addition, free testing is still available for any other Flint school, including daycares and Head Starts. Free testing is also available for any Flint resident.

Additional information, including more detailed lead screening results, is available at www.michigan.gov/flintwater.

###

INITIAL

1) CORROSION CONTROL FOR 350K

2) RECOMMENDING THAT SCHOOLS BE TIER I TESTING FOR L&C

3) REFRESH SCHOOL EDUCATION TO EVALUATE TIER SYSTEMS

WHO WILL BE THE POINT TO ?
INTERACT WITH SCHOOLS

- SCHEDULE A MEETING WITH SUPERINTENDANT TO HAVE A KICKOFF MEETING WITH 13 SCHOOLS

Testing Plan, Process & Protocols
DRAFT – January 27, 2016

Five Prong Approach to Overall Testing:

1. **Residential Testing coordinated by the DEQ, DHHS & the City**
2. **School Testing coordinated by DEQ & DLARA**
3. **Elevated Blood Level Testing coordinated by DEQ, DHHS & GCHD**
4. **Food Service Establishments coordinated by DEQ, MDARD & GCHD**
5. **Establishing Sentinel Sites coordinated by EPA, DEQ & the City**

6. WATER DISTRIBUTION & PLANT

1. **Residential Testing coordinated by the DEQ, DHHS & the City**
   a. Coordination points of contact include Mike Glasgow (City), George Kristian (DEQ), Linda Dykema (DHHS)
   b. Testing continues on a weekly basis associated with the City's drinking water distribution system
   c. Testing is offered to all residents with an emphasis on zip codes 48503 and 48504 which were identified by Dr. Mona Hanna-Attisha as having the greatest risk for lead exposure
   d. The DEQ Lab is EPA certified. In addition, a random set of samples will be split and samples will be tested by the EPA laboratory to ensure data integrity
   e. Those exceeding 100 PPB are referred to DHHS for offer of wrap around services
   f. If initial blood testing result is greater than 5 ug/dl then elevated blood level investigation ensues
   g. In the event elevated blood lead levels are identified in the residents of the priority homes, DEQ and DHHS will partner to develop a sampling plan for additional homes adjacent to the homes of residents with elevated levels.
   h. If a water result is greater than 15 PPB then a follow up test will be offered to see if levels are coming down and if remediative efforts are working
   i. Residents will receive an official laboratory report, indicating whether or not lead or copper were detected in their water. Test results will be supplied through the City as well as on the www.michigan.gov/flintwater website
   j. All residents are being told to continue the use of filters and bottled water until the emergency health advisory has been lifted for the city or the their area

2. **School Testing coordinated by DEQ & DLARA**
   a. Coordination points of contact include George Kristian (DEQ), Shelly Edgerton (LARA) and various managers of affected schools, facilities and programs
   b. Testing includes all public, charter and parochial schools, daycare programs, boys and girls clubs as well as facilities with at risk individuals

c. To date, no lead service lines have been identified in the Flint Community Schools
d. Eight teams being stood up to conduct plumbing evaluations to identify fixtures that need to be replaced
e. Follow up action is then taken in coordination with DLARA to remove and replace all fixtures identified as needing replacement
f. Follow up sampling is then done to ensure that remediative actions worked
g. Sampling protocol goes way beyond the lead / copper rule and identifies sources of contamination (example: some schools have had over 250 samples taken on a single day)

3. **Elevated Blood Level (EBL)Testing coordinated by DEQ, DHHS & GCHD**
   a. Coordination point of contact includes George Kristian (DEQ), Linda Dykema (DHHS), Jim Henry (GCHD)
   b. When DHHS identifies residents with elevated blood lead levels those residents are offered a free evaluation of their home to identify potential exposure pathways of their home; these evaluations now include the addition of water testing
   c. The water testing that is done is similar to the school testing in that it is comprehensive in nature
   d. Initial samples are taken at points in the home where water is used for consumptive purposes
   e. After initial samples are taken, a series of ten consecutive one liter samples are taken to identify potential issues deeper in the plumbing
   f. In addition to the evaluations, residents are provided with information in ways to reduce exposure risks

4. **Food Service Establishments coordinated by DEQ, MDARD & GCHD**
   a. Coordination points of contact include George Kristian (DEQ), Sandra Walker (MDARD), Jim Henry (GCHD)
   b. MDARD is sending out staff to collect samples from food service establishments to see if the water being used in soft drink dispensers, ice machines, coffee machines and other similar equipment contains high levels of lead.
   c. These samples are being sent to the DEQ Lab for analysis and the reports sent back to MDARD for follow up.

5. **Establishing Sentinel Sites coordinated by EPA, DEQ & City**
   a. Coordination points of contact George Krisztian (DEQ), Jim Sygo (DEQ), Bob Kaplan (EPA), Miguel Deltoral (EPA), Mike Glasgow (City), Natasha Henderson (City), Mayor Weaver (City)
   b. There will be 200 residences identified that will serve as sentinel sites for ongoing lead and copper testing. After the initial round of testing, these sites will be resampled every two weeks for an additional four, two week

cycles. The purpose for this testing is to establish a baseline and to be able to do trend analysis to see how quickly the protective layer is being rebuilt through the supplemental phosphate that the city is adding to the water that it receives from the DWSD.

c. After the initial round has been completed the data will be shared with all of the partners so that a consensus can be reached as to what the data means. This process will be repeated with every sampling round and areas of the city will be cleared provided that a scientific analysis of the data shows through consensus agreement that such action is warranted.
d. It is likely that even after the city returns to a condition of compliance under the lead and copper rule that areas of concern will remain. Efforts will be made to identify these areas of concern so that additional services can be provided to identify and remediate sources of lead contamination in these isolated instances.
e. Within sentinel testing, looking to achieve 90% of the samples at 5 PPB

Krisztian, George (DEQ)

From: Thelen, Mary Beth (DEQ)
Sent: Friday, October 16, 2015 2:53 PM
To: DEQ-EXE-All
Subject: Director's 8:00 Exec Team List for Monday, October 19, 2015

Dear Executive Team attending the 8:00 Monday morning meeting:

Below are the Director's items for the 8:00-8:30 Executive Team (the larger group this time) meeting on Monday, October 19.

Executive

- City of Flint Drinking Water and Action Steps
- Director's Advisory Council for October 23 - discuss agenda
- Directors' Schedule this week - Governor's Meeting on Budget, ECOS STEP Meeting, Director's Advisory Council, other Misc. Items
- Pipeline Advisory Safety Council – October 28, 1:30-3:30
- ECOS STEP Meeting in Washington DC (October 21)
- Congressional Visits in DC (October 21-22)
- Mid West Environmental Compliance Conference, Chicago (October 29 and 30) – What are the final travel plans?
- Any followup from the meeting with the Governor on Recycling – September 23
- Any follwoup from the meeting with the Governor on Enbridge – September 23
- Michigan Petroleum Pipeline Task Force – Implementation of Recommendations
- Employee Survey Results – Action Plan
- Organizational Excellence
- Invasive Carp Updates
- District Visits – Lansing District on October 12
- Enforcement Policy (signed last week)

Admin (Amy Epkey)

- 2017 Budget Development
- Groundwater Fees
- Updates on Underground Storage Tank Authority
- Michigan Strategic Water Fund
- Administration Division In-Service Suggestions
- Budget

AQD

- 111d Updates
- Air Rules

OGL

- Water Strategy

OEA

- Action Learning Teams
- Environmental Justice
- Compliance Assistance/Customer Service/Employee Engagement

ODWMA
- City of Flint Drinking Water
- SAW Grants

OWMRP
- Recycling Council Updates
- Ontario Power Generation and MHSA

OOGM
- High Density Oil & Gas Development Workgroup

WRD
- Water Use
- Lake Erie Issues
- Enbridge
- Waters of the US/Wetlands/Blueberries
- DWSD
- Part 31 Water Rules Strategy
- Part 5, Part 13, Part 23, Part 22

RRD
- 201 Amendments
- 201 Criteria Workgroup

Thanks.

Mary Beth Thelen
Management Assistant to Director Dan Wyant
Department of Environmental Quality
Constitution Hall, 6th Floor South
Phone: 517-284-6712 or 284-6700 (new numbers)
Fax: 517-241-7401
Thelenm2@michigan.gov

Senior Management Team Meeting
Monday, October 19, 2015
8:30 a.m. – 9:45 a.m.
Great Lakes Conference Room
AGENDA

Call-In No. for District Coordinators: 1-877-873-8018; Access Code: 3467059#

Director's Report

In-Depth Discussions:

9:00-9:30:

- FOIA Updates and Q and A (Tom Quasarano, State Operations Division/DAG

Chief Deputy Director's Report

Discussion and Future SMT Meeting Agenda Items

Next SMT Meeting: November 2, 2015

Future Items of Discussion:
Budget
Long Term Funding
Organizational Excellence
Engagement
Communication Issues

GL

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

WG-15J

June 24, 2015

MEMORANDUM

SUBJECT: High Lead Levels in Flint, Michigan – Interim Report

FROM: Miguel A. Del Toral
Regulations Manager, Ground Water and Drinking Water Branch

TO: Thomas Poy
Chief, Ground Water and Drinking Water Branch

The purpose of this interim report is to summarize the available information regarding activities conducted to date in response to high lead levels in drinking water reported by a resident in the City of Flint, Michigan. The final report will be submitted once additional analyses have been completed on pipe and water samples.

Following a change in the water source, the City of Flint has experienced a number of water quality issues resulting in violations of National Primary Drinking Water Regulations (NPDWR) including acute and non-acute Coliform Maximum Contaminant Level (MCL) violations and Total Trihalomethanes (TTHM) MCL violations as follows:

Acute Coliform MCL violation in August 2014
Monthly Coliform MCL violation in August 2014
Monthly Coliform MCL violation in September 2014
Average TTHM MCL violation in December 2014
Average TTHM MCL violation in June 2015

In addition, as of April 30, 2014, when the City of Flint switched from purchasing finished water from the City of Detroit to using the Flint River as their new water source, the City of Flint is no longer providing corrosion control treatment for lead and copper.

A major concern from a public health standpoint is the absence of corrosion control treatment in the City of Flint for mitigating lead and copper levels in the drinking water. Recent drinking water sample results indicate the presence of high lead results

for lead were 104 ug/L and 397 ug/L. The level of iron in the water also exceeded the capability of the measurement (>3.3 mg/L). The lead results were especially alarming given that the samples were collected using the sampling procedures described above, which minimize the capture of lead. When contacted by U.S. EPA Region 5, the MDEQ indicated that the lead was coming from the Walters' plumbing. Ms. Walters had previously indicated that all of the plumbing in the home was plastic.

Following the confirmation of the initial high lead results, U.S. EPA Region 5 conducted two visits to the Walters' home on April 27, 2015 and May 6, 2015. Based on an inspection of the plumbing and subsequent sampling conducted at the Walters' residence, it was determined that except for a few minor metallic connectors, all interior plumbing, including the pipes, valves and connectors are made of plastic certified by the National Sanitation Foundation (NSF) for use in drinking water applications. Subsequent sampling showed that the faucets in the home appear to be compliant with the new lead-free requirements and are also not the source for the high lead levels. Our inspection of the interior plumbing and analysis of follow-up sampling results demonstrate that the home plumbing network is not the source of the high lead levels found at the Walters' residence. The photographs and all sampling results will be included in the final report.

Based on the U.S. EPA inspection and documentation of the plastic plumbing at the Walters' residence, it was suspected that the high lead was being introduced into the Walters' home plumbing from outside the home, likely from a lead service line. Three portions of the service line were extracted during a subsequent trip on May 6, 2015 and sent for analysis, when the Walters' service line was replaced. Analyses performed to date indicate that a portion of the service line is made of galvanized iron pipe. Inspection of the remaining portion from the water main to the external shut-off valve confirmed that the portion from the water main to the external shut-off valve is a lead service line.

Ms. Walters has also provided U.S. EPA with medical reports on her child's blood lead testing indicating that the child had a low blood lead level (2 ug/dL) prior to the source water switch and an elevated blood lead level following the switch (6.5 ug/dL). Redacted copies of these reports will also be included in the final report.

Subsequent to the discovery of high lead levels in the Walters' drinking water, the water to the Walters' home was shut off on April 3, 2015. The water was briefly turned back on to collect additional samples on April 28, 2015. Since the water had stagnated for an extended period of time, the kitchen tap was flushed for 25 minutes the night before collecting the samples. Three sets of samples were collected at different flow rates (10 at low flow, 10 at medium flow and 10 at high flow).

As previously mentioned, the City of Flint currently has no mitigating treatment for lead and is also planning another source water change in the near future. U.S. EPA's Office of Research and Development in Cincinnati has extensive experience in corrosion and corrosion control treatment and distribution system issues and would be a valuable addition to the drinking water advisory group for the City of Flint. Copies of the qualifications and experience for Michael Schock and Darren Lytle have been forwarded to MDEQ.

2. U.S. EPA should review the compliance status of the City of Flint with respect to whether the system is in violation of the LCR requirement to install and maintain optimal corrosion control and whether the MDEQ is properly implementing the LCR provisions regarding optimal corrosion control treatment requirements for large systems. Pursuant to 40 CFR Section 141.82(i), the EPA Regional Administrator may review treatment determinations made by a State and issue federal treatment determinations consistent with the requirements of the LCR where the Regional Administrator finds: (1) A state has failed to issue a treatment determination by the applicable deadlines; (2) A State has abused its discretion in a substantial number of cases or in cases affecting a substantial population; or (3) The technical aspects of a State's determination would be indefensible in an expected Federal enforcement action taken against a system.

3. The U.S. EPA should review whether relevant resident-requested samples are being included by the City of Flint in calculating the 90th percentile compliance value for lead. Recent drinking water tests conducted at homes in Flint for lead that are not part of the compliance sampling pool have revealed high lead levels in the drinking water. The U.S. EPA memorandum signed on December 23, 2004 provides clarification on compliance determinations and states that customer-requested samples are to be included in the 90th percentile lead compliance calculation where the sampling is conducted during the monitoring period from sites and sampling procedures meeting the LCR criteria. Given the prevalence of lead service lines in the City of Flint, should these sample results be from homes with lead service lines, the sample results would be considered compliance samples under the LCR.

Also attached is a timeline of events for Flint, Michigan. Should you have any questions regarding the information or recommendations provided, please let me know.

cc: Liane Shekter-Smith (MDEQ)
Pat Cook (MDEQ)
Stephen Busch (MDEQ)
Michael Prysby (MDEQ)
Marc Edwards (Virginia Tech)
Michael Schock, EPA-ORD
Darren Lytle, EPA-ORD

Draft

November 6, 2015

Mr. Michael Glasgow
Utilities Administrator
City of Flint
4500 North Dort Highway
Flint, Michigan 48505

WSSN: #2310

Dear Mr. Glasgow:

SUBJECT: Water Supply – City of Flint – Compliance Communication
Lead and Copper Rule Compliance Sampling Sites

The City of Flint community water system is subject to the requirements of the Michigan Safe Drinking Water Act, 1976 Public Act 399, as amended (Act 399). According to Department of Environmental Quality (DEQ) records, City of Flint reports submitted to the DEQ regarding Lead and Copper Rule (LCR) compliance monitoring information have been certified by the City of Flint that all LCR compliance monitoring since 1992 has been conducted at sampling sites meeting the Tier 1 criteria listed under subrule 1c of Administrative Rule 710a (R325.10710a).

The City of Flint's recent efforts to electronically convert customer service line information and statements by some of the City's certified operators conflict with the information provided in the City's LCR compliance monitoring certification reports.

Therefore, the DEQ is hereby requesting the City of Flint provide additional information and documentation regarding all 324 historic LCR compliance sampling sites.

As of November 3, 2015, the City of Flint electronic database of customer service connections listed 10,895 records of converted customer service connection index cards. The City of Flint has recently indicated it has a total of 29,072 customer service connections, leaving approximately 18,177 records left to be converted. These digital records include a listing of the service line material.

The DEQ has obtained a copy of these 10,895 digital records and cross referenced them with the addresses for the City's 324 historic LCR compliance monitoring sites. However, only 46 of the 324 sites were able to be matched at the current time. Of these 46 sites, only 6 sites contained information confirming the Tier 1 site criteria based on having lead service line materials. 14 sites were listed as having no available information (n/a), and require additional documentation to justify being designated as a Tier 1 sample site having a lead service line. The remaining 26 cross referenced sites were listed as having copper service line materials which directly conflicts with the City's LCR reports certifying these sites as Tier 1 based on the criteria of having a lead

service line. The City shall provide additional information to the DEQ demonstrating these sites meet the Tier 1 site criteria.

The City's remaining 278 historic LCR compliance sampling sites must also be reviewed and require additional documentation be submitted to the DEQ to justify being designated as Tier 1 sample sites.

Our office has provided the enclosed table with information regarding all 324 of the City's historic LCR compliance monitoring sites, when each site was utilized, the City's certification information for each site, and information cross referenced from the City's customer service line database. The City shall use the far right column in this table, labeled *Justification of Lead Service Line and Tier 1* Criteria, to summarize the City's justification for certifying these sites as Tier 1 and having a lead service line. Any supporting documentation regarding the justification for each site shall be provided as separate attachments.

As a reminder, in accordance with Subrule 1 of Administrative Rule 710a (R325.10710a), by January 1, 1992 the City of Flint was to have completed a materials evaluation of its distribution system to identify a pool of targeted sampling sites from which all first draw samples are collected. This evaluation was required to include information from:

- Special Monitoring for Corrosivity Characteristics
- All plumbing codes, permits, and records in the files of the building department or departments that indicate the plumbing materials installed within publically and privately owned structures connected to the water distribution system.
- All inspections and records of the distribution system indicating material composition of customer service connections.
- Water quality information that indicates locations which may be particularly susceptible to high lead or copper concentrations.

The completed table and all supporting documentation must be provided to our office as soon as possible, but by no later than December 30, 2015, prior to the next LCR compliance monitoring period.

Please contact me at 517-290-8817 or prysbym@michigan.gov at your earliest convenience to discuss this matter in more detail.

Sincerely,

DRAFT

Michael F. Prysby, P.E.
District Engineer
Lansing District Office
Office of Drinking Water and Municipal Assistance

cc: Mr. Robert Bisnick, City of Flint
Mr. Brent Wright, City of Flint
Mr. Howard Kroft, City of Flint
Ms. Natasha Henderson, City of Flint
Mr. Jim Sygo, Chief Deputy Director, MDEQ
Mr. Stephen Busch, MDEQ
Mr. Adam Rosenthal, MDEQ

DRAFT

State of Michigan
Department of Environmental Quality
Administration Division
Flint Appropriations Spending Progress
For Fiscal Year 2016

			Appropriation	Expended	Remaining
04770	**City of Flint Emergency Water Services**				
	0001	General Fund	5,000,000	5,000,000	0
	0549	Settlement Funds	1,000,000	1,000,000	0
	Total		**6,000,000**	**6,000,000**	**0**
04732	**Drinking Water & Environmental Health**				
	0001	General Fund [2]	300,000	12,051	287,949
	Total		**300,000**	**12,051**	**287,949**
04526	**Laboratory Services**				
	0001	General Fund [3]	1,000,000	35,984	964,016
	Total		**1,000,000**	**35,984**	**964,016**
	Grand Total		**7,300,000**	**6,048,035**	**1,251,965**

Notes:

1) Expenditures are as of December 31, 2015.

2) George is currently working on a contract agreement with Genesee County Health Department for about $200,000 for additional testing & monitoring.

3) Laboratory charges are for tests completed through December 10, 2015.

Updated: January 19, 2016

4425 (Rev. 04-15)

STATE OF MICHIGAN
DEPARTMENT OF TREASURY
LANSING

RICK SNYDER
GOVERNOR

NICK A. KHOURI
STATE TREASURER

Flint Water Timeline (11-09-15)

1. **June 26, 2012** – Letter from Flint EM Mike Brown to DWSD for permission to begin blending Flint River water with treated water from DWSD. The letter indicates that the DEQ is supporting this option and its implementation would save the City between $2M and $3M annually.

2. **September 20, 2012** – Letter from Flint EM Ed Kurtz to DWSD requesting written permission to implement the blending option. Approval is requested by October 1, 2012.

3. **October 31, 2012** – Analysis by the Flint Finance Director suggests that the annual cost to purchase water from DWSD will steadily increase to $23M per year by fiscal year 2020.

4. **November 2012** – Treasury retains Tucker, Young, Jackson and Tull (TYJT) to evaluate the KWA proposal to the City of Flint.

5. **November 6, 2012** – Letter from Flint Emergency Manager Ed Kurtz to State Treasurer Dillon that a proposal from DWSD is expected but that the initial assessment is that switching to KWA is in the best interest of the City of Flint.

6. **February 6, 2013** – TYJT issues a final report to Treasury on the comparison between Karegnondi Water Authority (KWA) and DWSD. Analysis suggests that the KWA option is the cheaper option for the City of Flint.

7. **March 2013** – DWSD contacts the City of Flint to begin direct negotiations on a contract extension. Multiple options are provided to the Flint Emergency Manager (EM) Ed Kurtz.

8. **March 25, 2013** – The Flint City Council endorses joining KWA.

9. **April 11, 2013** – State Treasurer Andy Dillon authorizes Flint EM Ed Kurtz, pursuant to Section 12(3) of P.A. 436 of 2012, to enter into a contract with KWA if a final offer from DWSD is either not received for rejected in good faith based upon specific objections.

10. **April 15, 2013** – DWSD provides a best and final offer to the City of Flint. Analyses by Flint EM Ed Kurtz, the Department of Environmental Quality and Treasury's Office of Fiscal Responsibility independently conclude that the KWA option is cheaper for the City of Flint.

11. **April 16, 2013** –Flint EM Ed Kurtz informs the State Treasurer that the City will join KWA. This decision was officially announced May 1, 2013.

12. **April 17, 2013** – DWSD transmits a letter to Flint EM Ed Kurtz terminating service to the City of Flint, effective April 17, 2014.

13. **June 26, 2013** – Groundbreaking for the Karegnondi Water Authority begins. Flint also requests full time use of the Flint Water Treatment Plant with Flint River water as a source.

14. **June 28, 2013** – Financing Contract between the City of Flint and KWA is approved. Effective August 1, 2013. This document was signed by EM Mike Brown.

15. **July 08, 2013** – The City retains Lockwood, Andrews & Newman engineering firm to get the City's water plant up and running while the KWA pipeline is built.

16. **February 19, 2014** – The KWA Board of Directors adopts Resolution 2014-01, authorizing KWA to bond for water line construction on-behalf of the City of Flint.

17. **April 17, 2014** – Water service from DWSD officially ends. The City of Flint also conducts two separate public forums regarding the use of Flint River water, upgrades to the City's water system and the overall cost of the switch to KWA.

18. **April 25, 2014** – City conducts public event marking the transition to the use of Flint River water. DEQ information shows that transition complete by May 2015.

19. **January 2, 2015** – The City issues a press release stating the City water system exceeds the TTHM maximum contaminant level.

20. **March 3, 2015** – Flint EM Jerry Ambrose provides a memorandum to Deputy State Treasurer Wayne Workman stating that a reconnection to DWSD will cost the City $10.1M/year and that water purchases could be as high as $1M/month.

21. **March 12, 2015** – Veolia issues the final operational evaluation of the City's water system.

22. **September 3, 2015** – MDEQ testing of the City's water shows TTHM levels are below the required action level.

23. **September 25, 2015** – Genesee County Health Department and the City of Flint issues a lead advisory for residents to be aware of lead levels in drinking water after hearing concerns from the medical community.

24. **October 16, 2015** – The City of Flint reconnects to Detroit Water.

25. **November 4, 2015** – The EPA issues its final report on high lead levels at three residences in the City.

Sample Number	ANALYTE	RESULT	Sample_Description	Site_Code	INVADD1	INVADD2	INVADD3
LF90213	Lead	0.003	FLUSHED BATH = SHOWER		829 WELLINGTON	FLINT	48503
LF90214	Lead	0.125	FIRST DRAW EXTERIOR 1		829 WELLINGTON AVE	FLINT	48503
LF90215	Lead	0.307	FLUSHED EXTERIOR 2	HOUSE EXTERIOR SIDE C	829 E WELLINGTON AVE	FLINT	48503
LF90216	Lead	0.022	FLUSH BASEMENT 2		829 WELLINGTON	FLINT	48503
LF90217	Lead	Not detected	FLUSHED KITCHEN #2		829 WELLINGTON AVE	FLINT	48503
LF90218	Lead	0.008	FIRST DRAW BATH 1 SHOWER		829 WELLINGTON AVE	FLINT	48503
LF90219	Lead	Not detected	FIRST DRAW KITCHEN 1		829 WELLINGTON AVE	FLINT	48503
LF90220	Lead	2.324	FIRST DRAW BASEMENT 1		829 WELLINGTON AVE	FLINT	48503

Sample Number	ANALYTE	RESULT	Sample_Description	Site_Code	INVADD1	INVADD2	INVADD3
LF90213	Lead	0.003	FLUSHED BATH = SHOWER		829 WELLINGTON	FLINT	48503
LF90214	Lead	0.125	FIRST DRAW EXTERIOR 1		829 WELLINGTON AVE	FLINT	48503
LF90215	Lead	0.307	FLUSHED EXTERIOR 2	HOUSE EXTERIOR SIDE C	829 E WELLINGTON AVE	FLINT	48503
LF90216	Lead	0.022	FLUSH BASEMENT 2		829 WELLINGTON	FLINT	48503
LF90217	Lead	Not detected	FLUSHED KITCHEN #2		829 WELLINGTON AVE	FLINT	48503
LF90218	Lead	0.008	FIRST DRAW BATH 1 SHOWER		829 WELLINGTON AVE	FLINT	48503
LF90219	Lead	Not detected	FIRST DRAW KITCHEN 1		829 WELLINGTON AVE	FLINT	48503
LF90220	Lead	[redacted]	FIRST DRAW BASEMENT 1		829 WELLINGTON AVE	FLINT	48503

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LF90220	Lead	[redacted]	FIRST DRAW BASEMENT 1		829 WELLINGTON AVE	FLINT	48503

Strategy for Assessing and Reducing Lead in Drinking Water in Schools

Summary

Objective: To determine the levels of lead (Pb) at cooking and drinking water outlets within schools served by the city of Flint municipal water supply.

Action Steps:

- Develop a Sampling Plan

  Detailed instructions will be provided to each school regarding actions to be taken the day prior to sampling and the day of sampling.

  Each tap/outlet used for cooking or drinking water will be sampled.

  Samples will be collected at prescribed intervals to determine whether (1) an outlet is a source of lead, (2) the supply pipe is a source of lead, (3) brief flushing may provide reduced lead levels. Other samples, as necessary, to identify a unique concern identified by the plumbing assessment.

  All samples will be analyzed by the MDEQ certified drinking water laboratory.

- Develop a Plumbing Profile

  By identifying what materials are used in facility plumbing, and where they are located, it is possible to determine where monitoring and what sampling regimen will be effective in analyzing water likely to contain lead.

  A plumbing assessment will assist in determining how the potable water piping flows in the building and the order in which samples will be collected.

- Evaluate the Analytical Results

  The analytical results will be evaluated and compared to the 15 ppb Pb action level benchmark established by U.S. EPA in the federal lead and copper rule in the Safe Drinking Water Act.

- Action in Response to Findings

  Any tap/outlet with lead levels that exceed 15 ppb may be resampled, removed from service, or other measure(s) taken. Short term and more permanent measures/controls will be identified.

- Follow-up Sampling

  Follow-up sampling may be necessary to ensure that any site specific measures/controls have been effective.

- Communication

  An effective communications strategy is critical to explain potential risks, describe technical solutions and build trust among parents, school and local health department officials, and the water supplier. Public health agencies will provide information to assist schools with their communications.

Development of this summary protocol is based on U.S. EPA technical guidance entitled "3Ts for Reducing Lead in Drinking Water in Schools (EPA 816-B-05-008)", the American Water Works Association guidance "Assisting Schools and Child Care Facilities in Addressing Lead in Drinking Water" and other state and local health department school lead sampling and assessment guidance.

Wurfel, Brad (DEQ)

From: Egan, Paul <pegan@freepress.com>
Sent: Thursday, December 10, 2015 12:44 PM
To: Wurfel, Brad (DEQ)
Cc: Minicuci, Angela (DHHS)
Subject: RE: Flint water

It's only three basic questions, Brad. I just gave you some extra background and context. 5 p.m.?

From: Wurfel, Brad (DEQ) [mailto:WurfelB@michigan.gov]
Sent: Thursday, December 10, 2015 12:43 PM
To: Egan, Paul <pegan@freepress.com>
Cc: Minicuci, Angela (DHHS) <MinicuciA@michigan.gov>
Subject: RE: Flint water

That's not much lead time, Paul. We'll do what we can with this. What's your deadline for response?

Brad Wurfel
Communications Director,
Michigan Department of Environmental Quality
wurfelb@michigan.gov
517-230-8006 (cell)

From: Egan, Paul [mailto:pegan@freepress.com]
Sent: Thursday, December 10, 2015 11:56 AM
To: Wurfel, Brad (DEQ)
Cc: Minicuci, Angela (DHHS)
Subject: Flint water

Hi Brad/Angela: I am writing a story for Friday's paper about former Flint Mayor James Sharp, Jr. calling for federal investigations and more comprehensive outreach efforts to contact and test those who may have drank Flint water containing unsafe levels of lead.

Sharp, who was Flint mayor from 1983 to 1987, also has another somewhat unique perspective on the issue of contaminated drinking water. He was a U.S. Marine stationed at Camp Lejeune in the 1950s, where it was later determined drinking water was contaminated with cancer-causing chemicals such as the dry cleaning fluid perchloroethylene.

Sharp told the Free Press in an interview Wednesday that his daughter born on the base, who died at the age of two months, may have been a victim of the toxins.

Sharp said after learning of the contamination in the 1980s, officials created a database and contacted him and thousands of others who may have drank the water.

In 2012, President Obama signed federal legislation providing medical care to those who drank the Camp Lejeune water.

Similar actions, along with investigations by the U.S. Justice Department and FBI, need to be taken in response to the situation in Flint, Sharp said.

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

GK

Flint Drinking Water Events Timeline

- April 2013 – Flint notifies DWSD of contract discontinuation and joins the Karegnondi Water Authority
- April 2013 – DWSD sets termination of Flint water service contract to April 17, 2014
- June 2013 – Karegnondi Water Authority groundbreaking
- June 2013 – Flint notifies DEQ of intent to use of Flint Water Treatment Plant full time with Flint River
- May 2014 – Flint stops purchasing DWSD water. Starts using the City of Flint WTP and Flint River
- August 2014 – Flint E.Coli Bacteria violation, Partial System Boil Water Advisory
- August 2014 – Disinfection Byproducts, DEQ requests preemptive Operational Evaluation
- September 2014 – Flint Total Coliform Bacteria violation, Partial System Boil Water Advisory
- November 2014 – Disinfection Byproducts violation begins
- January 2015 – 1st 6 month lead and copper sampling completed 100 samples, 90th% = 6 ppb
- July 2015 – 2nd 6 month lead and copper sampling completed 69 samples, 90th% = 11 ppb
- August 2015 – Disinfection Byproducts return to compliance
- August 2015 – Flint required by DEQ to recommend and install Optimized Corrosion Control Treatment
- September 24, 2015 – Hurley Children's Hospital data reveals high lead levels in Flint children
- October 8, 2015 – State screening results show elevated lead levels in Flint schools
- October 2015 (anticipated) – Flint switches back to DWSD for water
- July 2016 – Planned connection to Karegnondi Water Authority (Lake Huron water to Flint WTP)

Flint Drinking Water Action Plan Update

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

Key Actions:

- The Flint Technical Advisory Committee (TAC) meeting was held on November 9. The meeting included representatives from the EPA, DEQ, DHHS, and city of Flint, as well as other interested parties. Representatives from the city of Flint indicated that they were modifying the sampling protocol instructions to remove a reference to pre-flushing of service lines just prior to the beginning of the stagnation period for samples being utilized for compliance with the lead and copper rule. An update was given regarding a water plan that outlines short-term, intermediate term, and long-term goals that the city of Flint is working on in order to get switched over to the Karegnondi Water Authority. DEQ staff discussed corrosion control dosages and monitoring requirements in detail with the city of Flint and its consultants. Representatives from EPA reiterated the need for higher dosages of phosphate in order to expedite the formation of a protective layer in the city of Flint's water distribution system. This would be a supplemental addition of phosphate to the water coming from Detroit that only contains what is considered to be a maintenance dose.

- The samples for Brownell K-2 STEM Academy and Eisenhower Elementary School were analyzed and the data consolidated into spreadsheets. The results for both schools parallel the results found at Freeman Elementary School, in that the issues appear to be primarily located at the fixture. The percentage of locations needing corrective action appears to be greater than what was found at Freeman. Work has begun on putting together reports that provide recommendations for addressing the issues that were found. Once the reports have been completed, they will be shared with the Flint Community Schools Superintendent, and then the reports will be published to the Flint water Web site: www.mi.gov/flintwater.

- The water samples for Doyle/Ryder Elementary School and Pierce Elementary School have been analyzed. The results for these schools are currently being compiled and evaluated.

Positions:

- There are no new positions to report since last week.

Concerns:

- A Notice of Intent to Sue has been received from the Natural Resources Defense Council and the American Civil Liberties Union of Michigan. The subject reads:

Notice of Intent to Sue Under the Safe Drinking Water Act, 42 U.S.C. § 300j-8(b)(1)(a), for Failure to Control Lead in Drinking Water in Flint, Michigan, and Failure to Assist Michigan Schools with Lead Testing and Remediation

- A letter was sent by the DEQ on November 9 requesting the city of Flint to provide additional information and documentation concerning discrepancies between the water service line material reported in the lead/copper reporting forms and the water service line material reported in digitized water service index cards. The city of Flint must also complete the correlation for all of the remaining lead/copper sampling locations that were used since the start of monitoring under the lead and copper rule in 1992. Any additional further discrepancies must be explained. The city must complete this task by December 30. The existence of these discrepancies has been made public by the media.

Significant Events:

- A Frequently Asked Questions document has been prepared to address key events and decisions surrounding the Flint water situation. This document is being presented to the Governor's Flint Water Task Force to assist in providing key information to the investigation.

- DEQ Director Dan Wyant was interviewed by Rochelle Riley, *Detroit Free Press*, on November 10. Topics of discussion included the results from Freeman Elementary School and short-term, intermediate term, and long-term plans to address issues with Flint's water supply, as well as a discussion of corrosion controls and how they will be implemented moving forward.

- DEQ Flint Action Plan Coordinator George Krisztian was interviewed by NBC News 25 on November 11. The main topic of conversation was the results from Freeman Elementary School. The main point was that the results clearly indicated that the issues at the school were fixture-specific and were not deep within the plumbing infrastructure.

Changes from Previous Report:

- A meeting is scheduled for November 20 among DEQ staff to discuss draft legislative changes to Part 54 of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

- The draft time line was shared with the Governor's Flint Water Task Force on November 13.

- DEQ staff discussed corrosion control dosages and monitoring requirements in more detail with the city of Flint and their consultant during the November 9 Flint TAC meeting. Orthophosphate dosage concerns brought to the table by the city of Flint's consultant were addressed by DEQ and EPA staff.

- DEQ staff followed up with the city of Flint during the November 9 TAC meeting regarding installation of corrosion control and confirmed that the chemical feed pumps have been ordered and delivery is approximately two weeks out. The Flint Water Treatment Plant (WTP) operators are currently installing the feed system piping and water booster pumps. The city of Flint anticipates having the corrosion control feed system installed and ready for operation by the end of November.

- DEQ staff has drafted a letter that establishes standby operation (test run) requirements for the Flint WTP, based upon the city's previous test run Monthly Operation Reports. The draft letter also discusses the potential for Flint to obtain a limited supply of raw water directly to the Flint WTP from the Karegnondi Water Authority prior to spring 2016 for treatment evaluation. The draft letter will be finalized and sent to the city of Flint the week of November 16.

- DEQ staff discussed with Genesee County during the November 9 TAC meeting the most recent stop work orders issued by the Lapeer County Road Commission (LCRC). Genesee County is continuing to install the pipeline and is working with the LCRC to correct the soil erosion control issues. Genesee County has not expressed a concern of this delaying their construction schedule.

- The DEQ sent a letter to the city of Flint on November 9. The letter requests the city of Flint to provide additional information/documentation concerning discrepancies between the water service line material reported in the lead/copper reporting forms and the water service line material reported in digitized water service index cards. The city of Flint must also complete the correlation for all of the remaining lead/copper sampling locations that were used since the start of monitoring under the lead and copper rule in 1992. Any additional further discrepancies must be explained. The city of Flint must complete this task by December 30.

- The draft sampling protocol was shared with DHHS on November 10.

- DEQ staff, Jim Sygo and Michael Prysby, attended the November 9 Flint TAC meeting as described above. Chief Deputy Director Sygo also presented DEQ's findings of the results of the lead sampling conducted at Freeman Elementary School.

- DEQ and DLARA staff completed plumbing assessments at Durant-Tuuri-Mott Elementary School and the central kitchen on November 13.

- DEQ staff conducted water sampling at Durant-Tuuri-Mott Elementary School and the central kitchen on November 14.

Other Items:

- As provided by the DHHS, the purchased total water filter/pitcher distribution through November 13 is approximately 14,000 units.

- Attached are the draft spreadsheets that consolidate the lead data for Brownell K-2 STEM Academy and Eisenhower Elementary School.

Prepared by: George Krisztian, Flint Action Plan Coordinator
Laboratory Director
Department of Environmental Quality
Telephone: 517-284-6719
Cell: PPI
November 16, 2015

Department of Environmental Quality
Drinking Water Program Budget Request
December 21, 2015

Appropriation	FTEs		Amount
One-Time (2016 Supplemental)			
City of Flint Emergency Water Services		$	3,900,000
Support half of the cost for Flint to stay on the Great Lakes Water Authority water system for six additional months (July 1, 2016 - December 31, 2016) until the Karegnondi Water Authority pipeline is completed			
Total One-Time Funding		$	3,900,000
Ongoing			
Drinking Water and Environmental Health Staff			
Corrosion Control Specialists	3	$	450,000
Sampling Staff	2	$	300,000
Lab Staff	3	$	450,000
Service Line Verification Staff	2	$	300,000
Total Staff	10	$	1,500,000
Local Health Department Contracts and Testing Fees		$	1,000,000
Lab Equipment		$	300,000
Travel		$	100,000
Other Supplies and Services		$	100,000
Total Ongoing Funding		$	3,000,000
Total Funding Request		**$**	**6,900,000**

Supplemental Boilerplate

Sec. xxxx. From the funds appropriated for the City of Flint Emergency Water Services, the department is authorized to pay $3,900,000 of the water connection service costs to the Detroit Water and Sewerage Department or its successor. The payments shall only be made once a legally executable agreement has been reached between the parties. The funds are intended to support half of the connection costs for July 1, 2016 through December 31, 2016.

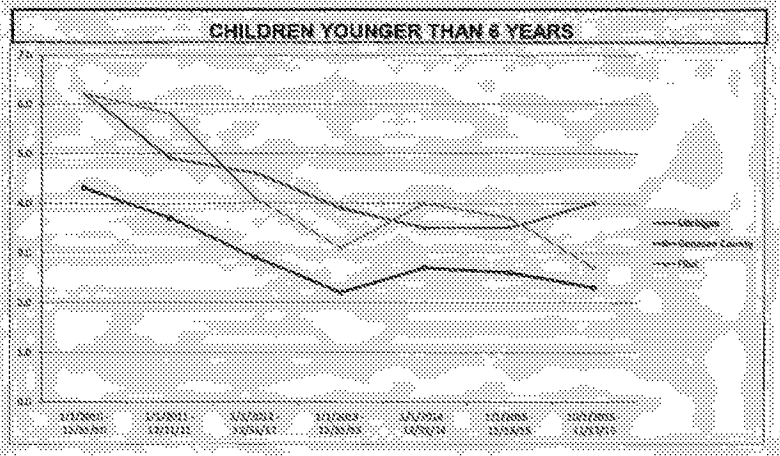
- Connection Cost 4 million? (Interconnect with Genesee County)
- Assumption 50/50 Partnership

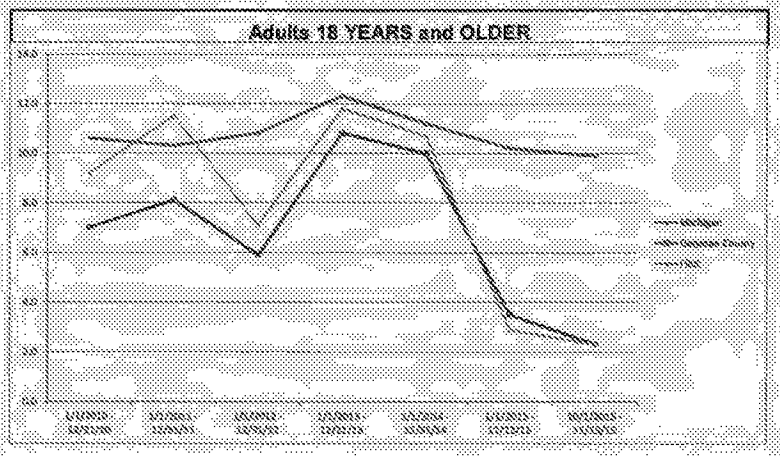
City of Flint Water
Action Steps for Week of October 12-16

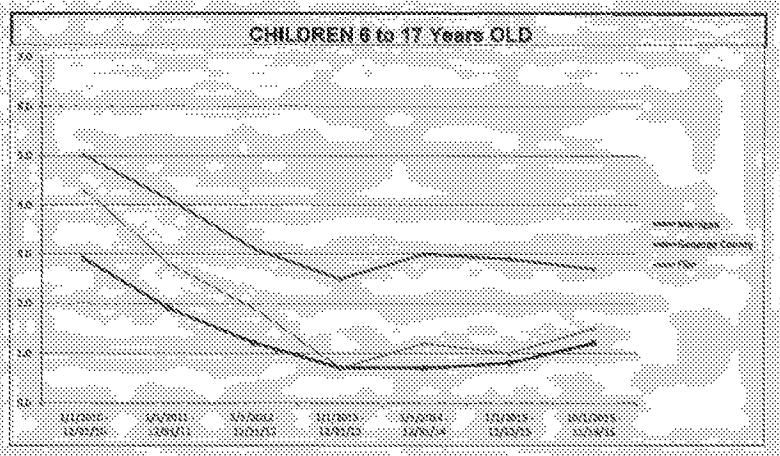
Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Identify schools and prioritize for assessment	GCISD, GCHD, DEQ, DHHS, and Flint	Steve Busch	Completed
2.	Get DLARA plumbers organized	DEQ and DLARA	Steve Busch	DLARA inspectors are ready
3.	Complete sampling instructions	DEQ, DHHS, and EPA	Pat Cook	Incorporating comments from partners
4.	MDARD information for restaurants	MDARD, DHHS, and DEQ	Dana DeBruyn	Completed; document in review process for Web site
5.	Update 2004 letter to EPA	DEQ	Dana DeBruyn	
6.	Approve Flint plan for water line	DEQ, Flint, and Genesee County	Mike Prysby	1st sample set results were not detected; 2nd sample set results are pending; determination of flush water disposal pending by Flint
7.	Lead education plan for schools for drinking water	DHHS and DEQ	Liane Shekter Smith	DEQ working with DHHS to determine who will be the lead
8.	Begin regular meetings with Flint	DEQ and Flint	George Krisztian	Meeting confirmed and scheduled for 10/16/15

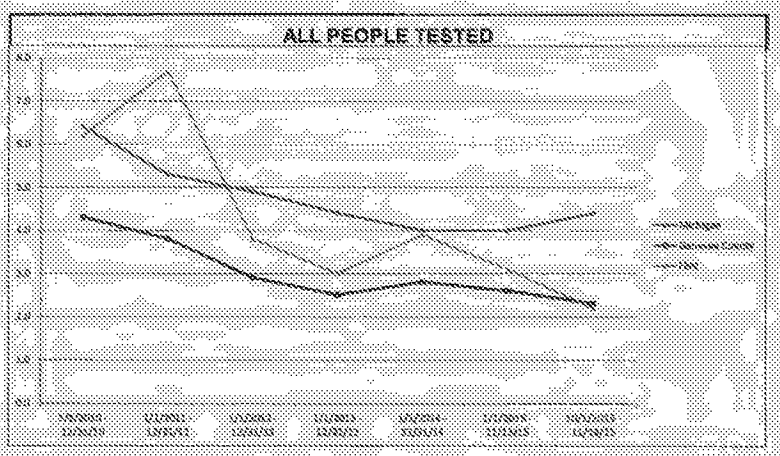
Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
9.	Schedule Flint Water Treatment Plant tour	DEQ and Flint	George Krisztian	Tour tentatively scheduled for 10/16/15; waiting on confirmation
10.	Meet with schools and DLARA – invitation only	DEQ, DLARA, and Flint schools	Karen Tommasulo	Done 10/16/15
11.	Update DEQ Web page	DEQ	Karen Tommasulo	Done 10/12/15
12.	Contact DHHS to see where they are with United Way regarding emergency declaration	DEQ and DHHS	George Krisztian	Completed; DHHS to notify DEQ if status changes
13.	Circulate protocol draft with EPA	DEQ and EPA	Liane Shekter Smith	Initial draft completed; comments received from EPA
14.	Contact city about homeowner sample delivery	DEQ and Flint	George Krisztian	
15.	Communicate to MDARD and Flint that business samples should be coordinated though DEQ laboratory	DEQ, MDARD, and Flint	Liane Shekter Smith George Krisztian	Liane to call MDARD and George to call Flint
16.	Figure out number of samples from schools and child care facilities	DEQ	Liane Shekter Smith Pat Cook Steve Busch	
17.	Confirm Linda Dykema is Point of Contact for DHHS	DEQ	George Krisztian	Done
18.	Contact Karegnondi Water Authority (KWA) to find out if there are any bottlenecks we need to remove	DEQ and KWA	Mike Prysby	Bottlenecks identified with Lapeer County Road Commission
19.	Expedite 399 Plan and Phosphate Plan	DEQ and Flint	Mike Prysby	Corrosion control optimization studies in process

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
20.	Get update on service line index card conversion and identify where partial replacements exist	DEQ and Flint	Steve Busch	
21.	Make sure DHHS gets information so they can cross reference	DEQ and DHHS	Steve Busch	
22.	Legislative contacts	DEQ	Maggie Pallone	Supplemental appropriations bill (HB 4102) passed in the House 105-0 (10/14/15) and the Senate 37-0 (10/15/15)
23.	Legislative time line and summary	DEQ	Maggie Pallone	Provided backgrounder and time line to legislators on 10/13/15
24.	Reconnect with State Superintendent Brian Whiston	DEQ and Department of Education	Dan Wyant	Conference call conducted on 10/12/15
25.	Conduct After Action Plan	DEQ	George Krisztian	Initial meeting to be scheduled for week of 10/19/15
26.	Change Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone Liane Shekter Smith Sonya Butler	


CHILDREN YOUNGER THAN 6 YEARS


Adults 18 YEARS and OLDER


CHILDREN 6 to 17 Years OLD


ALL PEOPLE TESTED

DEQ's Flint Action Plan

1. After Action Plan (FAQ) will be ready by noon 11/16/15

2. School Test Data
   a. Reports not held
   b. Steve Reports
   c. George Spreadsheet

3. Blood Exposure-Dan to speak with Nick

4. Meeting with Mayor
   a. Harvey Hollins lead
   b. Dan, Jim and George to attend

5. Messaging moving forward

6. Sampling Protocol
   a. Establish Relationship with EPA Region 5-General Agreement on Protocol

7. Lead Service Line Replacement
   a. RLF directed at lead service line replacement
   b. Amy Epkey, Maggie, Sonya

8. Create Relationships with EPA
   a. Jim—Bob
   b. Dan—Susan
   c. Mike & Steve—Karen & Mike
   d. GEORGE — TOM BURKE

9. Meet with Mott to do Lead Service Line Identification Study discuss

10. Lead Education Program
    a. Nick & Dan - DHHS Point

11. Moving KWA Forward

12. Enforcement Response
    a. With until after Dec 30th

13. TAC-monitor closely

14. Dan bring in Joan Rose

15. Public Outreach
    a. Mayor
    b. GCHD
    c. Dr. Reynolds, Wells & Davis
    d. Ministers
    e. Land Bank
    f. Legislators

16. Communicate with other PWS's

17. Letter to Schools
    a. EPA guidance on testing
    b. Work with state superintendent
    c. ~~Need list of Systems that are out of Compliance~~
    ~~d. Make Recommendations to EPA about LCR~~

18. Need list of Schools out of Compliance

19. Make recommendations to EPA about LCR

- We have historical information on the treated and raw water going back for a number of years
- Operational testing was done quarterly for approximately a week each time
- The Water Treatment Plant demonstrated its ability to generate water that met the requirements of the Safe Drinking Water Act
- Except under the two emergency situations that occurred in 2009, this water was not released into the distribution system

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
Pre-1967	Flint Water Treatment Plant in operation using Flint River for drinking water	1
Post-1967	Flint switched to Detroit Water and Sewerage Department for drinking water	None
January 2006	Discussions regarding Karegnondi Water Authority, *Preliminary Long-Term Water Supply for Genesee County*	2
June 25, 2009 September 2009	*Lake Huron Water Supply Study* *Karegnondi Water Authority* Executive Summary and Preliminary Engineering Report	3
March 2013	*Analysis of the Flint River as a Permanent Water Supply for the City of Flint*; Prepared for: City of Flint dated July 2011	4
April 2013	Flint notifies Detroit Water and Sewerage Department of contract discontinuation and joins the Karegnondi Water Authority	5
April 2013	Detroit Water and Sewerage Department sets termination of Flint water service contract to April 17, 2014	6
June 2013	Flint notifies the Department of Environmental Quality of intent to operate Flint Water Treatment Plant full time using Flint River for drinking water	7
April 2014	The Michigan Department of Environmental Quality issues Flint Water Treatment Plant construction permits for full time operation enhancements	9
May 2014	Flint stops purchasing Detroit Water and Sewerage Department water. Starts using the City of Flint Water Treatment Plant and Flint River for drinking water	10
August 2014	Flint *E. coli* bacteria violation, localized system Boil Water Advisory	11
September 2014	Disinfection Byproducts compliance communication; the Michigan Department of Environmental Quality requests preemptive Operational Evaluation	12
September 2014	Flint total coliform bacteria violation, localized system Boil Water Advisory	13

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
October 2014	General Motors announces decision to stop using Flint River as source for production water	14
December 16, 2014	Disinfection Byproducts quarterly violation begins	15
December 31, 2014	1st 6-month round of lead and copper monitoring ends. Results due from Flint to Michigan Department of Environmental Quality on January 10, 2015	None
January 21, 2015	City of Flint Public Meeting regarding disinfection byproducts and bacteria	17
February 26, 2015	E-mail from United States Environmental Protection Agency to Michigan Department of Environmental Quality regarding elevated lead sample	18
February 27, 2015	E-mail from United States Environmental Protection Agency to Michigan Department of Environmental Quality inquiring about Optimized Corrosion Control Treatment	19
February 27, 2015	Michigan Department of Environmental Quality response to United States Environmental Protection Agency email with statement regarding optimized corrosion control program	20
March 5, 2015	2nd Disinfection Byproducts quarterly violation notice	21
March 30, 2015	Michigan Department of Environmental Quality notifies Flint of Lead/Copper Monitoring Results.	16
April 3, 2015	Long Term 2 Enhanced Surface Water Treatment Rule Letter	22
April 6, 2015	Flint proposes installation of Granular Activated Carbon Filter media to reduce disinfection byproducts	23
April 23, 2015	United States Environmental Protection Agency e-mail to Michigan Department of Environmental Quality regarding corrosion control treatment	24
April 24, 2015 May 1, 2015	Michigan Department of Environmental Quality responds to United States Environmental Protection Agency regarding corrosion control treatment	25

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
April 27, 2015	United States Environmental Protection Agency provided bottles to 212 Browning for lead/copper analyses	26
May 6, 2015	Lead service line replaced at 212 Browning. United States Environmental Protection Agency on-site	27
May 28, 2015	Internal United States Environmental Protection Agency e-mail regarding results at 212 Browning	29
June 9, 2015	3rd Disinfection Byproducts quarterly violation notice	30
June 10, 2015	Semi-Annual Conference call with United States Environmental Protection Agency	31
June 30, 2015	E-mail from United States Environmental Protection Agency scheduling conference call on July 21, 2015 regarding elevated lead result and concerns regarding corrosion control	32
June 30, 2015	2nd 6-month round of lead and copper monitoring ends. Results due from Flint to Michigan Department of Environmental Quality on July 10, 2015	None
July 9, 2015	Michigan Department of Environmental Quality informed that United States Environmental Protection Agency draft internal memo is on ACLU website	33
July 14, 2015	Michigan Department of Environmental Quality issues construction permit to Flint for Granular Activated Carbon filter media W151055	34
July 21, 2015	Conference call with United States Environmental Protection Agency (Lead and Copper Rule implementation and Flint) during which it informs Michigan Department of Environmental Quality its interpretation of Lead and Copper Rule	35
July 24, 2015	Michigan Department of Environmental Quality e-mail and draft letter 90th percentile lead determination = 11 parts per billion and City of Flint requirement to add corrosion control treatment	36

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
July 28, 2015	Michigan Department of Environmental Quality received blood lead level information from Michigan Department of Health and Human Services indicating that results since the switch to the Flint River are consistent with past years seasonal variations	37
August 4, 2015	Meeting with city representatives at Governor's office	38
August 17, 2015	Michigan Department of Environmental Quality notifies Flint of lead/copper monitoring results and requires City to install corrosion control treatment	39
August 23, 2015	Michigan Department of Environmental Quality notified by an external party that a water quality study was about to begin in Flint	40
September 2, 2015	Disinfection Byproducts return to compliance	43
September 11, 2015	United States Environmental Protection Agency e-mail confirming that Michigan Department of Environmental Quality was never sent the draft June 24, 2015 memo	44
September 21, 2015	Meeting with Congressional representatives, legislators, United States Environmental Protection Agency and Michigan Department of Environmental Quality to discuss issues with water quality in Flint	45
September 22, 2015	Meeting/Conference call with Michigan Department of Health and Human Services, Genesee County Health Department, and Michigan Department of Environmental Quality to discuss lead education/outreach	46
September 24, 2015	Hurley Children's Hospital data reveals elevated blood lead levels in Flint children	47
September 24, 2015	Michigan Department of Health and Human Services response affirms State blood lead level data is more comprehensive than Hurley Hospital data	None

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

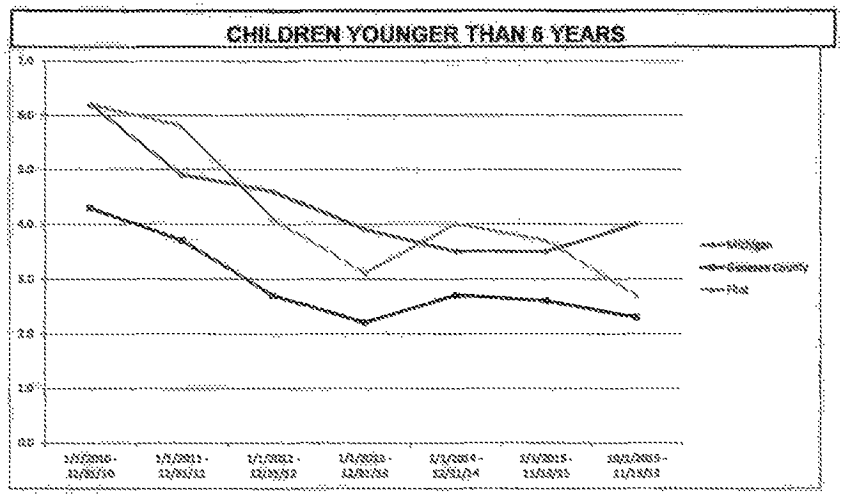
Date	Event	Attachment
September 25, 2015	Flint issues Lead Advisory regarding drinking water	48
October 1, 2015	State Chief Medical Officer confirms Hurley blood lead level data	None
October 1, 2015	Genesee County Health Department issues "Do Not Drink" Advisory	49
October 2, 2015	Michigan Department of Environmental Quality and Michigan Department of Health and Human Services press conference. Governor's Flint Action Plan announced.	50
October 2, 2015	Genesee County Health Department school screening water samples collected for lead analysis	51
October 8, 2015	Governor Press Conference: Flint to reconnect to Great Lakes Water Authority/Detroit Water and Sewerage Department	52
October 15, 2015	State Legislature authorizes a $9 million to assist the City of Flint to pay for the return to the Detroit water system and to fund staff at schools to gauge lead exposure	None
October 16, 2015	First weekly coordination meeting held between the City of Flint and state agencies	None
October 16, 2015	Michigan Department of Environmental Quality meets with Flint Schools Superintendent and Genesee County Health Department	None
October 16, 2015	Flint switches back to Detroit Water and Sewerage Department for water	53
October 21, 2015	Governor Snyder announces formation of Flint Water Task Force to complete an After Action Review	None
October 28, 2015	Michigan Department of Environmental Quality issues construction permit for additional corrosion control treatment	54
October 30, 2015	Michigan Department of Environmental Quality letter to Flint regarding corrosion control treatment operation	55

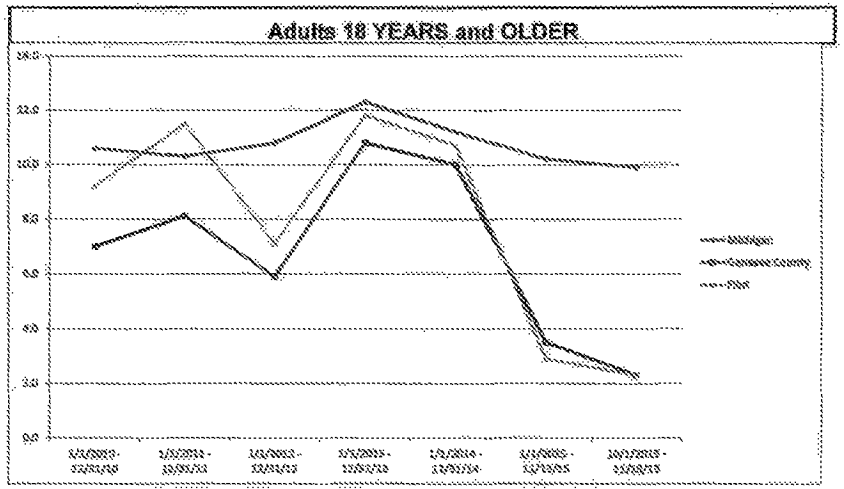
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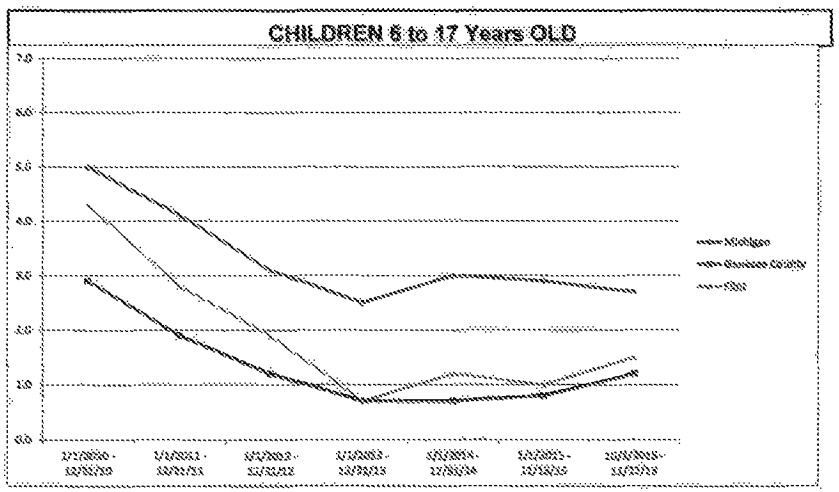
#4 12/9/15 SUPPLEMENT CC BEGINS

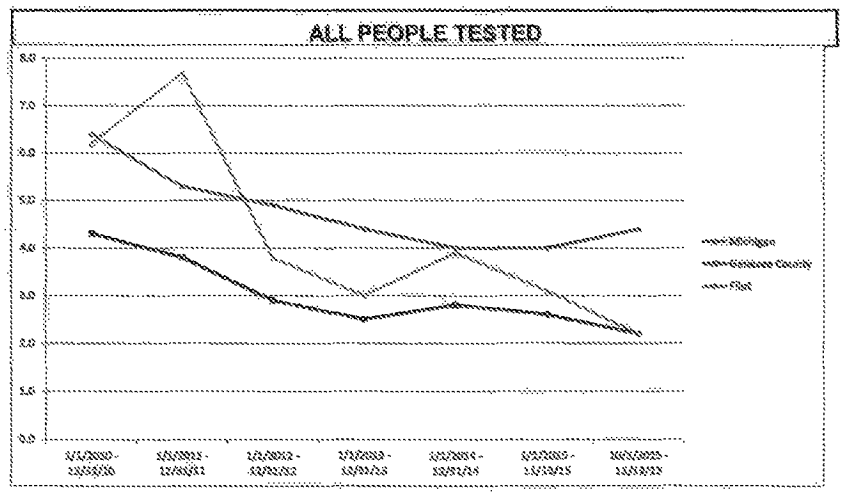
MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
November 3, 2015	United States Environmental Protection Agency Memorandum regarding "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems"	56
November 4, 2015	United States Environmental Protection Agency Memorandum regarding "Transmittal of Final Report – High Lead at Three Residences in Flint, Michigan"	57
Mid-Late 2016	Planned connection to Karegnondi Water Authority (Lake Huron water to Flint Water Treatment Plant)	None


CHILDREN YOUNGER THAN 6 YEARS


Adults 18 YEARS and OLDER


CHILDREN 6 to 17 Years OLD


ALL PEOPLE TESTED

Krisztian, George (DEQ)

From: Prysby, Mike (DEQ)
Sent: Friday, November 13, 2015 5:00 PM
To: Krisztian, George (DEQ)
Cc: Shekter Smith, Liane (DEQ)
Subject: Action Steps Week of 11/9 - 11/13

George,

Below is an update of the Action Steps worked on during the week of Nov. 9th.

Action Step No. 7: Follow-up with city of Flint regarding corrosion control treatment and their plans to address requirements and options provided for in 10/30/15 DEQ letter:

DEQ staff discussed corrosion control dosages and monitoring requirements in more detail with the city and their consultant during the Technical Advisory Committee (TAC) meeting on 11/9/2015. Orthophosphate dosage concerns brought to the table by the city's consultant were addressed by DEQ and EPA staff.

Action Step No. 8: Follow-up with the city regarding installation of corrosion control:

DEQ staff followed-up with city during the TAC meeting regarding installation of corrosion control confirmed that the chemical feed pumps have been ordered and delivery is approximately two weeks out. WTP operators are currently installing the feed system piping and water booster pumps. The city anticipates have the corrosion control feed system installed and ready for operation by the end of this month.

Action Step No. 9: Review Monthly Operation Reports (MORs) for Standby Operation of Flint WTP with the city of Flint; draft letter to city of Flint documenting Standby Operation requirements:

DEQ staff has drafted a letter that establishes standby operation (test-run) requirements for the Flint WTP based upon the city's previous test run MORs. The draft letter also discusses the potential for Flint to obtain a limited supply of raw water directly to the WTP from KWA (prior to spring 2016) for treatment evaluation. The draft letter will be finalized and sent to the city early next week.

Action Step No 10: Work with KWA and other agencies to address bottleneck issues; check weekly for status updates:

DEQ staff discussed the most recent stop work orders issued by the Lapeer County Road commission with Genesee County during the TAC meeting. The county is continuing to install the pipeline and is working with the road commission to correct the soil erosion control issues. The county has not expressed a concern of this delaying their construction schedule.

Action Step No 11: Continue evaluating city of Flint Service Line Record status and comparison to sampling pool:

DEQ's letter was sent to the city on 11/9/2015. The letter requests the city to provide additional information/documentation concerning discrepancies between the water service line material reported in the Lead/Copper Reporting forms and the water service line material reported in digitized water service index cards. The city must also complete the correlation for all of the remaining lead/copper sampling locations that were used since the start of monitoring under the LCR in 1992. Any additional further discrepancies must be explained. The city must complete this task by December 29, 2015.

Action Step No 15: Attend TAC meeting on 11/9/15

DEQ staff, Jim Sygo and Michael Prysby attended the TAC meeting on 11/9/15. Mr. Prysby participated in the meeting as described in the Action Steps above. Mr. Sygo presented DEQ's findings of the results of the lead sampling conducted at the Freeman Elementary school.

Action Step No 18: Conduct sampling at Durant-Tuuri-Mott Elementary and Central Kitchen:

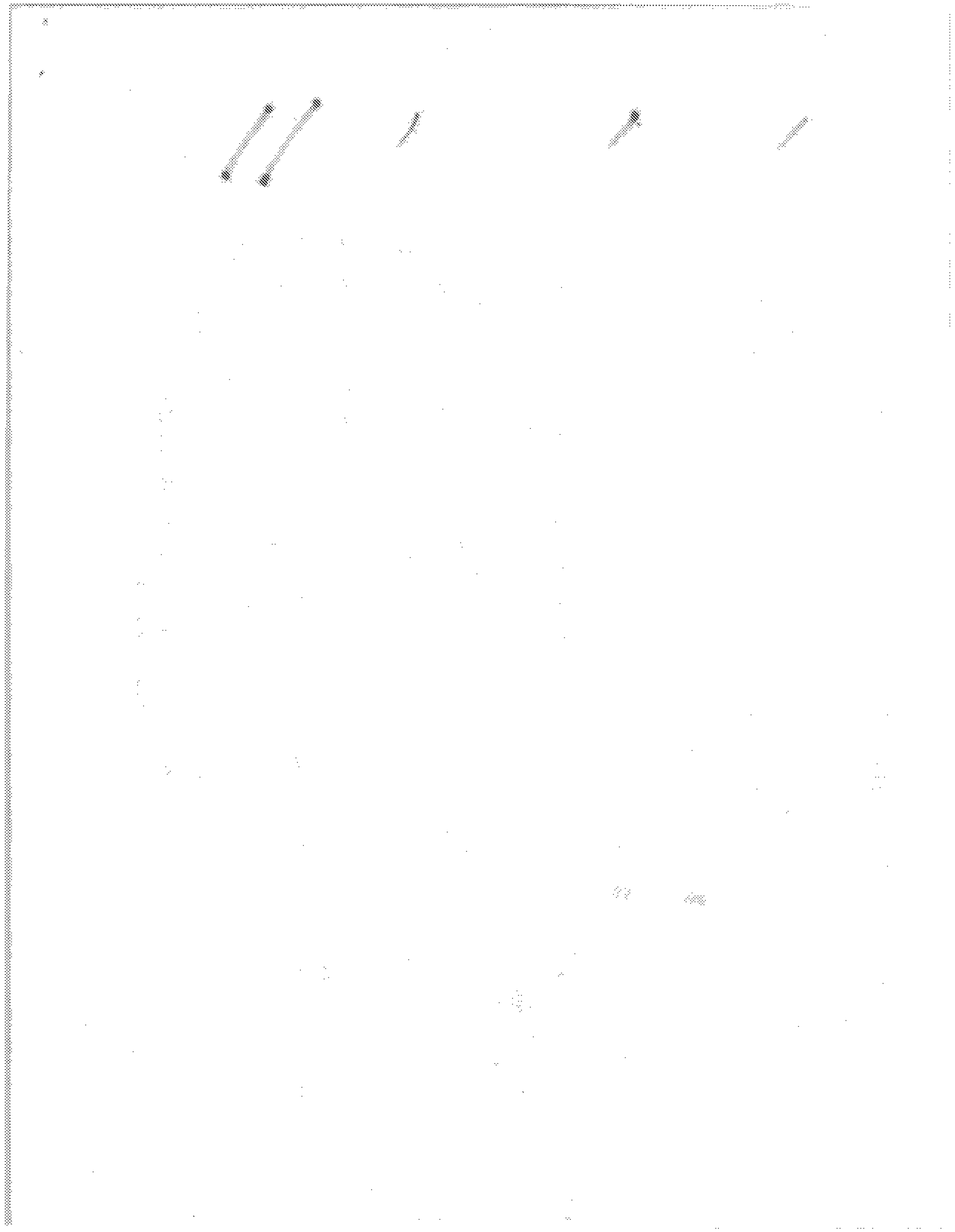
DEQ staff are scheduled to complete this task on 11/14/2015.

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 290-8817

City of Flint Water
Action Steps for Week of October 12-16

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Identify schools and prioritize for assessment	GCISD, GCHD, DEQ, DHHS, and Flint	Steve Busch	Completed
2.	Get DLARA plumbers organized	DEQ and DLARA	Steve Busch	DLARA inspectors are ready
3.	Complete sampling instructions	DEQ, DHHS, and EPA	Pat Cook	Incorporating comments from partners
4.	MDARD information for restaurants	MDARD, DHHS, and DEQ	Dana DeBruyn	Comments provided to MDARD
5.	Update 2004 letter to EPA	DEQ	Dana DeBruyn	
6.	Approve Flint plan for water line	DEQ, Flint, and Genesee County	Mike Prysby	Disinfection complete; waiting for test results and completion of system flushing
7.	Lead education plan for schools for drinking water	DHHS and DEQ	Liane Shekter Smith	DEQ working with DHHS to determine who will be the lead
8.	Begin regular meetings with Flint	DEQ and Flint	George Krisztian	Meeting tentatively scheduled for 10/16/15
9.	Schedule Flint Water Treatment Plant tour	DEQ and Flint	George Krisztian	Tour tentatively scheduled for 10/16/15
10.	Meet with schools and DLARA – invitation only	DEQ, DLARA, and Flint schools	Karen Tommasulo	
11.	Update DEQ Web page	DEQ	Karen Tommasulo	Done 10/12/15

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE



Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
12.	Contact DHHS to see where they are with United Way regarding emergency declaration	DEQ and DHHS	George Krisztian	Completed; DHHS to notify DEQ if status changes
13.	Circulate protocol draft with EPA	DEQ and EPA	Liane Shekter Smith	Sent Email Next Conference
14.	Contact city about homeowner sample delivery	DEQ and Flint	George Krisztian	
15.	Communicate to MDARD and Flint that business samples should be coordinated though DEQ laboratory	DEQ, MDARD, and Flint	Liane Shekter Smith George Krisztian	Liane to call MDARD and George to call Flint
16.	Figure out number of samples from schools and child care facilities	DEQ	Liane Shekter Smith Pat Cook Steve Busch	
17.	Confirm Linda Dykema is Point of Contact for DHHS	DEQ	George Krisztian	Done
18.	Contact Karegnondi Water Authority (KWA) to find out if there are any bottlenecks we need to remove	DEQ and KWA	Mike Prysby	Further discussions with Lapeer County may need to take place
19.	Expedite 399 Plan and Phosphate Plan	DEQ and Flint	Mike Prysby	Corrosion control optimization studies in process
20.	Get update on service line index card conversion and identify where partial replacements exist	DEQ and Flint	Steve Busch	
21.	Make sure DHHS gets information so they can cross reference	DEQ and DHHS	Steve Busch	
22.	Legislative contacts	DEQ	Maggie Pallone	Conference call with Sen. Jim Ananich conducted on 10/12/15

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
23.	Legislative time line and summary	DEQ	Maggie Pallone	Provided backgrounder and time line to legislators on 10/13/15
24.	Reconnect with State Superintendent Brian Whiston	DEQ and Department of Education	Dan Wyant	Conference call conducted on 10/12/15
25.	Conduct After Action Plan	DEQ	George Krisztian	To be scheduled for 10/15/15
26.	Change Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone Liane Shekter Smith Sonya Butler	

Flint Drinking Water Action Plan Update

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

Key Actions:

Due to the Thanksgiving holiday, this week's report is abbreviated.

Positions:

- There are no new positions to report since last week.

Concerns:

- There are no new concerns to report since last week.

Significant Events:

- There are no significant events to report since last week.

Changes from Previous Report:

- The Flint Drinking Water Events Timeline has been revised. The header and footer were updated, and acronyms were generally removed. Permit numbers have been deleted, and dates were filled in to the extent possible. The most significant change is the December 31, 2014, item regarding end of the 1st monitoring period. This was rewritten to be consistent with the June 30, 2015, end of the 2nd monitoring period item. The compliance letter reporting the results was added on March 30, 2015. The revised version is attached.

- School sampling was suspended due to the holiday and is scheduled to continue on Saturday, December 5, 2015.

- The report for Eisenhower Elementary School was completed, has gone through final publishing, and will be posted to the Flint water Web site: www.mi.gov/flintwater. A copy of the report is attached.

- There are now a total of four schools in Flint that are not part of the Flint Community Schools that have requested plumbing assessments and sampling of their facilities. These facilities will be evaluated once the Flint school system evaluation has been completed. The four facilities include: Eagle's Nest Academy, Powers Catholic High School, International Academy of Flint, and St. Paul Lutheran School. It is anticipated that these facilities will be evaluated beginning sometime in January 2016.

- The internal after action group met on November 24, 2015, to discuss the newly-created 18-Point Partnering Plan. Each point was reviewed, and members were instructed to use the document as a plan moving forward. The Partnering Plan is meant to be a living document and will be revised as needed.

Other Item:

- Attached are the updated Flint Drinking Water Events Timeline and the final report for Southwest Elementary School.

Prepared by: George Krisztian, Flint Action Plan Coordinator
Laboratory Director
Department of Environmental Quality
Telephone: 517-284-6719
Cell: PPI
November 30, 2015

Flint Water
EPA Emergency Administrative Order
Updated: 01/28/2016 1100

- **Chapter 55 "Shall cooperate with EPA for conducting sampling and other diagnostic activities"**
  - EPA Order Due Date: 01/21/2016
  - George Krisztian has been assigned this task. It is an ongoing process.
  - Reference: Mark Durno, USEPA
- **Chapter 60 "Shall not switch water supplies until plans have been submitted and approved"**
  - EPA Order Due Date: 01/21/2016
  - Richard Benzie and Mary Ann Dolehanty have been assigned this task and they have agreed.
- **Chapter 50 "Intent to Comply Letter"**
  - EPA Order Due Date: 01/22/2016
  - This task was completed by Director Creagh on 01/22/2016
- **Chapter 51 "Public Website posting all reports, plans, weekly status reports on progress, except Personally Identifying Information (PII)"**
  - EPA Order Due Date: 01/26/2016
  - George Krisztian is the person assigned to this task. The currently available information has been posted on the website and will be updated as more results become available.
- **Chapter 63 "Shall engage a panel of experts to advise and make public recommendations to the city on steps needed to mitigate the imminent and substantial endangerment to the health of persons and general operation of the city's PWS to comply with SDWA & NPDWRs"**
  - EPA Order Due Date: 01/28/2016
  - Jim Sygo has been assigned to this task. A panel of experts had a meeting in Flint on 01/27/2016 at 3:00 p.m. This is an ongoing task.
- **Chapter 52 "Is progress being made with corrosion control in the City? Respond to EPA Flint Task Force"**
  - EPA Order Due Date: 01/31/2016
  - Richard Benzie and Mary Ann Dolehanty have been assigned to this task. The city is being asked to provide data. This is an ongoing task.
  - EPA agreed on the dosing level for orthophosphate (01/27/2016).
  - Next step: Conduct weekly status calls with Flint Water Treatment Plant.
  - Review Monthly Operational Reports to ensure corrosion control treatment is appropriately maintained.
- **Chapter 53 "Water Quality parameter measurements in distribution system"**
  - EPA Order Due Date: 01/31/2016
  - Mike Glasgow (COF) and Richard Benzie have been assigned to this task. This is an ongoing task.
  - Ensure City conducts/provides WQP data as required and that during their weekly status call, they discuss WQP trends/concerns.

- **Chapter 53 "All lead in water testing results for the city since January 2013 including those not used for LCR compliance"**
  - EPA Order Due Date: 01/31/2016
  - Richard Benzie and Mary Ann Dolehanty have been assigned to this task.
  - Provide to those who maintain website any lead results in DEQ files for monitoring since Jan 2013 (target 01/29/2016).
  - Ensure ongoing monitoring results continue to be provided/posted to website.
- **Chapter 53 "Identification of areas by zip code in the city with elevated blood levels"**
  - EPA Order Due Date: 01/31/2016
  - George Krisztian has been assigned to coordinate with Linda Dykema. This is an ongoing process.
- **Chapter 54 "a. Existing inventory of homes with lead service lines in Excel or similar format"**
  - EPA Order Due Date: 01/31/2016
  - Dave Forstat is assigned to this task or compiling this data. Would like to obtain a list of billing addresses that receive Flint Water to aid in mapping. This is an ongoing task.
- **Chapter 54 "b. Addresses of homes that have had water service interruptions or street disturbances (e.g. water main breaks, etc.) within last year"**
  - EPA Order Due Date: 01/31/2016
  - This task has been assigned to Richard Benzie and Mike Glasgow (COF) and is an ongoing task.
- **Chapter 54 "c. Addresses of currently unoccupied homes"**
  - EPA Order Due Date: 01/31/2016
  - This task has been assigned to Richard Benzie and Natasha Henderson. MDEQ is working with the City of Flint Department of Public Works to acquire the data and map these locations. Would like to obtain information as to where water is turned off. This is an ongoing task.
- **Chapter 69 "Any agent, consultant or contractor used for carrying out this order shall also abide by record retention restrictions under this order"**
  - EPA Order Due Date: 01/31/2016
  - This task has been assigned to Jim Sygo and Mark DuCharme. The recommended action is to comply with order and provide instruction. Get a Document Unit Leader. This is an ongoing task.
- **Chapter 69 "Any agent, consultant or contractor used for carrying out this order shall also abide by record retention restrictions under this order"**
  - EPA Order Due Date: 01/31/2016
  - This task has been assigned to the Legal Team and Jim Sygo.
  - It is recommended that a letter should be drafted from DEQ to the City of Flint. All agents or contractors will be required to comply with the Retention Schedule of the EPA Order.
  - Identify record retention elements and provide direction to all personnel, agents, or contractors that are or may become, involved with the Flint water incident. Also need to prepare a Documentation Unit Leader task list and identify resource(s) needed to fill the position.
  - Suggest to request assignment of the Assistant Attorney General
  - This is an ongoing task.

- **Chapter 59 "City shall submit to DEQ the following items listed below:"**
  - EPA Order Due Date: 02/04/2016
- **Chapter 59 "a. Submit a plan and schedule to MDEQ for designated optimal corrosion control and water quality parameters and water monitoring plans"**
  - EPA Order Due Date: 02/04/2016
  - Richard Benzie and Mary Ann Dolehanty and staff have been assigned to this task.
  - Confirm with City that they will have plans completed and submitted by 02/04/2016.
- **Chapter 59 "b. Submit a sampling plan for daily monitoring submitted in a weekly report"**
  - EPA Order Due Date: 02/04/2016
  - Richard Benzie and Mary Ann Dolehanty and staff have been assigned to this task.
  - Confirm with the City that they will have plans completed and submitted by 02/04/2016.
- **Chapter 59 "C. Submit an operations plan for the corrosion control equipment submitted in weekly format including monitoring, calibration, verification and daily monitoring of finished water corrosion control parameters"**
  - EPA Order Due Date: 02/04/2016
  - Richard Benzie and Mary Ann Dolehanty and staff have been assigned to this task.
  - Confirm with the City that they will have plans completed and submitted by 02/04/2016.
- **Chapter 61 "City must demonstrate and MDEQ must ensure the city has necessary capable and qualified personnel to perform duties in PWS"**
  - EPA Order Due Date: 02/05/2016
  - Richard Benzie has been assigned to this task. This is an ongoing task.
  - MDEQ to get list of all operators employed at treatment plant and validate that they are properly certified, and to provide appropriate targeted training for Flint operations staff.
- **Chapter 62 "City will document and share steps to develop and implement a distribution system water quality optimization plan to MDEQ"**
  - EPA Order Due Date: 02/20/2016
  - Richard Benzie and Bryce Feighner have been assigned to this, in coordination with the City of Flint. This is an ongoing task.
  - Establish realistic due date. MDEQ to contact national drinking water organization currently working on distribution system optimization plan framework.
  - City to submit proposal by (date) and MDEQ and EPA to review/evaluate proposal.
- **Chapter 68 "After six years must notify EPA 60 calendar days prior to destruction of any data pertaining to this order"**
  - EPA Order Due Date: 01/21/2016
  - Susan Vorce, Jack Schinderle and the Legal Team have been assigned to this task.
  - To ensure consistency, retain all records following General Schedule #5, specifically GS5.10. When contacted regarding disposal, all records will be put on a litigation hold for one additional year, and not destroyed. U.S. EPA will be notified when the additional one-year litigation hold is put in place. This is an ongoing task.

- **Chapter 57 "Shall maintain chlorine residual in the distribution system in accordance to SDW and National Primary Drinking Water Regulations (NPDWR)"**
    - EPA Order Due Date: Monthly
    - Richard Benzie and his staff have been assigned to this task. This has been completed and ongoing.
    - Regulatory requirements already in place for residual chlorine. City is required to monitor chlorine regularly and report on Monthly Operating Reports.
    - Review Chlorine residual levels in weekly status calls.
- **Chapter 58 "City shall continue to add corrosion inhibitors at sufficient levels"**
    - EPA Order Due Date: Monthly
    - Richard Benzie and his staff have been assigned to this task. This is an ongoing task.

- **Chapter 68 "Preserve records and data for six years"**
    - Susan Vorce, Jack Schinderle, and the Legal Team have been assigned to this. This is an ongoing task.
    - To ensure consistency, retain all records following General Schedule #5, specifically GS5.10. When contacted regarding disposal, all records will be put on a litigation hold for one additional year, and not destroyed. Training will be conducted by DTMB Record Center to all DEQ staff to ensure consistency and understanding. This will be an ongoing task.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

RECEIVED
MAY 25 2011
ERMD - DWEHS

MAY 18 2011

REPLY TO THE ATTENTION OF:
WG-15J

Liane Shekter Smith, Chief
Environmental Resources Management Division
Michigan Department of Environmental Quality
P.O. Box 30273
Lansing, Michigan 48909-7773

RE: Fiscal Year (FY) 2010 End-of-Year Evaluation (EOY) for the Public Water System Supervision (PWSS) Program

Dear Ms. Shekter Smith:

The enclosed evaluation consists of a summary of PWSS program accomplishments and issues needing further attention, based on the Michigan Department of Environmental Quality (MDEQ) activities conducted under the FY 2010 Annual Resource Deployment Plan (ARDP), the State's FY 2010 EOY self-assessment and other information regarding the MDEQ's implementation of the PWSS program. The Michigan PWSS program and U.S. Environmental Protection Agency Region 5 have worked together for many years in a successful partnership to protect public health.

The Region commends the Michigan PWSS for continuing to direct public water supplies to develop and implement source water protection plans. The long term effect of this highly valuable prevention program is increased compliance and ultimately, better public health protection for the citizens of Michigan.

MDEQ is also commended for undertaking the implementation of the Stage 2 Disinfectant/Disinfection By-Products (Stage 2 DDBP) Rule, and the Long-Term 2 Enhanced Surface Water Treatment (LT2) Rule in Michigan, given MDEQ's limited staff and resources.

However, the severe budget crisis in Michigan that has been ongoing for the past 4-5 years has caused the Region concern regarding the State's ability to adequately fund its drinking water program in upcoming years. In recent years, the State has temporarily alleviated the programmatic effects of the budget crisis by:

- Prioritizing primacy activities that directly affect public health and temporarily disinvesting in certain non-public health related primacy activities. These temporary disinvestments have been documented in the ARDP, and Region 5 has acknowledged the State's disinvestments as necessary to ensure limited resources are used for activities that most directly affect public health protection, even though not all primacy activities are

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being implemented.

- Receiving funds for six set-aside programs from the Drinking Water Revolving Fund (DWRF) capitalization grant to assist with implementation of the PWSS program, and to fund 90% of Michigan's source water protection activities. A total of 28.1 Full-Time-Equivalent's (FTEs) are currently funded through the DWRF set-asides that would have been eliminated otherwise due to State budget cuts. However, the Region is concerned that MDEQ may not have the full 20% State match required for its DWRF capitalization grant awarded for FY 2012, which would decrease the set-aside funds available to maintain necessary staff.

Program disinvestments and DWRF set-aside funds discussed above, have enabled the State to maintain the PWSS program's ability to protect public health. However, the demands of the PWSS program are increasing and several core activities of the program are in need of resources, including:

- New Rule Implementation: Implementation of new regulations over the past ten years has substantially increased the workload for the State, especially the Noncommunity program which oversees over 10,000 systems. The demands of new rules also affect the essential activities of monitoring for and responding to acute contaminants as well as completing quality sanitary surveys. The full resource impact of the Ground Water Rule, which became effective in December 2009, has not yet been fully realized and the proposed Revised Total Coliform Rule will have unprecedented program ramifications for small systems if promulgated by EPA as proposed. Given the decreasing trend of resources, we are concerned that it will be difficult for the State to expand the PWSS program to take on additional work related to new rules.

- Field Surveillance Activities: In recent years, the importance of routine field surveillance activities, including sanitary surveys, has been highlighted. A key element of public health protection in the PWSS program is prevention, which is what Michigan's routine surveillance program has provided. Routine surveillance between sanitary surveys is critical to collaboration with public water systems to ensure safe drinking water. It is important to continue to prioritize resources to ensure routine field surveillance activities, including sanitary surveys, are conducted in a timely manner.

- Data Management: A primacy requirement under the PWSS program is that the State must maintain a data management system that tracks requirements for all rules. Proper maintenance and upgrading of its data management system ensures the State will be able to meet the requirements of its primacy agreement, which includes accurate reporting of violations to EPA.

1. MDEQ's Noncommunity staff is collaborating with Region 5 and EPA Headquarters to transition its data management system to the Safe Drinking Water Information System-State version (SDWIS-State).

2. It is anticipated that eDWR, the electronic laboratory report application that will allow laboratory data to flow directly to the Federal database, will be operational by the end of FY 2011.

3. Implementation of Compliance Decision Support (CDS) is complete for two rules; MDEQ expects to see the majority of distribution system compliance monitoring in the Federal database by the end of 2011.

The Region is concerned about the continued resource dilemma facing the MDEQ. However, the partnership between Region 5 and the MDEQ will continue to be the cornerstone for maintaining a strong drinking water program in Michigan. If you have questions, please contact me or Jennifer Crooks of my staff, at 312-886-0244.

Sincerely,

Thomas Poy

Thomas Poy, Chief
Ground Water and Drinking Water Branch

Enclosure

cc: Liz Browne, MDEQ
Carrie Monosmith, MDEQ
Richard Benzie, MDEQ
Dan Dettweiler, MDEQ
Kris Philip, MDEQ

Michigan Department of Environmental Quality (MDEQ)
Public Water System Supervision Program
End-of-Year Evaluation FY 2010

General Overview

Michigan's Public Water System Supervision (PWSS) program and U.S. EPA Region 5 Ground Water Drinking Water Branch (GWDWB) have worked together for many years in a successful partnership to protect public health by building a strong State drinking water program. MDEQ's focus on new rule implementation, the importance of source water protection as a preventative tool, and maintaining high compliance statistics indicate continued public health protection. However, due to the large number of staff retiring over the past year, the movement of programs and changes in the staffing caused by the reorganizations in January 2010 and in March 2011, and the drastic cuts being made by the Legislature, the Region is concerned how these actions are impacting the implementation of Michigan's drinking water program.

Resources

Region 5 understands the State's need to prioritize activities with its limited resources, and has acknowledged the State's temporary disinvestments in non-public health primacy activities as necessary to ensure public health protection, even though not all primacy activities are being implemented. Unfortunately, budget cuts increased the number of program disinvestments for FY 2010.

DWSRF set-asides

For FY 2010, the State requested funds for six set-aside programs from the Drinking Water Revolving Fund (DWRF) capitalization grant to assist with implementation of the PWSS program, and to fund 90% of Michigan's source water protection activities. In FY 2010, a total of 18.5 FTEs were funded through the DWRF set-asides that would have been eliminated otherwise due to State budget cuts; in FY 2011, 28.1 FTEs are currently being funded through the set-asides. The increase in FTEs funded through the set-asides from FY 2010 to FY 2011 points to the continuing dire financial situation in Michigan. The huge reductions in State resources would have devastated the PWSS program if not for funding through the DWRF set-asides. MDEQ may not have the full 20% State match required for its DWRF capitalization grant awarded for FY 2012, which would decrease the set-aside funds available to maintain necessary staff. MDEQ has effectively used DWRF set-aside funds to temporarily maintain the PWSS program to protect the public's drinking water; however DWRF set-aside funds are not a permanent source of funding.

Sanitary Surveys

Importance of Sanitary Surveys

A key element of public health protection in the drinking water program is prevention, which is what Michigan's routine surveillance program provides. The MDEQ's field presence at public water supplies, including sanitary surveys, is the cornerstone of the PWSS program; it is the "eyes and ears" of program implementation. Routine surveillance between sanitary surveys is critical to collaboration with public water systems to ensure safe drinking water. It is important to continue to prioritize resources to ensure routine surveillance activities, including sanitary surveys, are conducted in a timely manner.

Community water systems (CWS): Over the past 4 years, the State made a significant effort to improve sanitary survey timeliness at surface water systems. For FY 2010, the State committed that 90% of CWSs that use surface water, would have a sanitary survey conducted within the past 3 years. MDEQ

exceeded their commitment; a total of 96.3% of surface water CWSs had a sanitary survey conducted within the past 3 years.

Noncommunity water systems (NCWS):

Implementation of the Ground Water Rule (GWR) began in December 2009, which requires NCWSs using ground water to have a comprehensive sanitary survey conducted every 5 years. Due to the high staff turnover at most of the 44 Local Health Departments that implement the NCWS program, more sanitary survey training is necessary. MDEQ expects to complete 100% of required NCWS sanitary surveys in FY 2011; the State has completed 98% to date.

Data Management

A core requirement under the PWSS program is that a State must maintain a data management system that tracks requirements for all rules. Declining funding and staff resources are surfacing in the MDEQ's inability to maintain its data management systems for the long term. Specific needs include: the NCWS data management system, complete the Electronic Laboratory Report Application, and complete the incorporation of the Compliance Decision Support into SDWIS-State, which is discussed below.

Transition NCWS data management system to SDWIS-State: With Region 5 assistance, U.S. EPA Headquarters has offered MDEQ its contractor, SAIC, limited funding ($10,000) for the specific needs and costs necessary to develop a plan to move the NCWS data to SDWIS-State. Michigan's Department of Technology Management and Budget (MDTMB) is reviewing MDEQ's proposal to SAIC at this time.

CWS Electronic Laboratory Report Application (eDWR)

A major recommendation from the Data Verification in November 2009 identified the need to complete the electronic laboratory report application (eDWR) that will allow laboratory data to flow to SDWIS-State. Problems include shortages in MDTMB's resources, lack of funding to extend the existing contract outside of minimal maintenance funding, and competing priorities within the State's drinking water program. It is anticipated that eDWR will be operational by the end of FY 2011.

CWS Compliance Decision Support (CDS)

MDEQ continues to work with U.S. EPA Headquarters' SDWIS-State contractor (SAIC) to incorporate CDS into SDWIS/State. Competing staff priorities and constant new releases have made progress slow. However, MDEQ expects to see the majority of distribution system compliance monitoring in SDWIS by the end of 2011. MDEQ expects to transition entry point monitoring, including Phase 2/5 and radionuclide monitoring, to SDWIS during 2011 and 2012. Implementation of CDS will address some discrepancies found during the data verification related to Federal reporting.

Other Data Items:

--timeliness of and quality of quarterly data submittals continue to be an issue, though progress has been noted. The NCWS program has upgraded to FedRep 3.0 which will improve the accuracy of the States data submittal.

--MDEQ has begun to report GWR monitoring/reporting violations.

--NCWS reporting of locational data has improved to approximately 86% of all NCWS and 89% of NTNCWSs.

--CWS data management has automated the Lead and Copper Rule under SDWIS-State's CDS module. MDEQ is encouraged to continue to work to incorporate other rules.

--CWS program is very timely with its adoption of the latest versions of SDWIS-State, and is currently using SDWIS-State 2.2.2.

--MDEQ needs to continue to improve its reporting of sanitary surveys to SDWIS-FED, particularly the ground water system sanitary surveys now required by the GWR. The NCWS program is making progress in developing the capability to report sanitary surveys; this may be available within the next few months.

Drinking Water Compliance

During FY 2010, 96.5% of the Michigan population served by CWSs received drinking water that met health-based standards. This number exceeds Region 5's Federal FY 2010 national target, and Michigan's FY 2010 commitment of 95%. During FY 2010, 94.3% of Michigan CWSs were in compliance with health-based standards, which exceeded Region 5's Federal FY 2010 national target of 90%, and Michigan's FY 2010 commitment of 90%. During FY 2010, 99% of "person months" (i.e., all persons served by community water systems times 12 months) during which Michigan CWSs provided drinking water, met all applicable health-based drinking water standards. This number exceeds Region 5's Federal FY 2010 national target, and Michigan's FY 2010 commitment of 96%. MDEQ is commended for exceeding all FY 2010 commitments.

Enforcement

The Region appreciates the cooperative work-sharing in the area of enforcement. GWDWB is issuing Notices of Violation (NOVs) and Administrative Orders (AOs) as needed, to NCWSs that have repeatedly failed to monitor. However, the number of systems that MDEQ identified for Region 5 enforcement dropped from 14 in FY 2009 to 4 in FY 2010. We look forward to increasing this number and continuing this productive working relationship.

MDEQ committed to address 174 Significant Non-compliers or Priority systems in FY 2010. MDEQ addressed 286 Priority systems under the commitment which ended with the October 2010 SDWIS/FED data freeze, which is commendable.

Source Water Protection (SWP)

The Michigan interactive ground water mapping project (MIGWHP) has produced a tool that is developing affordable delineations for small ground water systems that otherwise would not have accurate delineations. The delineations assist systems in locating potential contaminant sources. MDEQ is currently updating all of its delineations to increase accuracy. All CWSs have been updated and MDEQ is currently re-delineating all NCWs.

MDEQ's funding for matching wellhead protection grants was cut in half from $600,000 to $300,000. As a result, MDEQ district engineers are encouraging systems to consider SWP as part of a typical operation and maintenance program during their sanitary survey visits. The Region encourages MDEQ to incorporate other sustainability activities into sanitary surveys, such as increased water and energy efficiency, in FY 2011 and FY 2012. Region 5 is also promoting asset management (AM) as a tool to strengthen small water system's capacity. The Region encourages the State to promote AM practices during sanitary survey and routine surveillance visits.

Conclusion

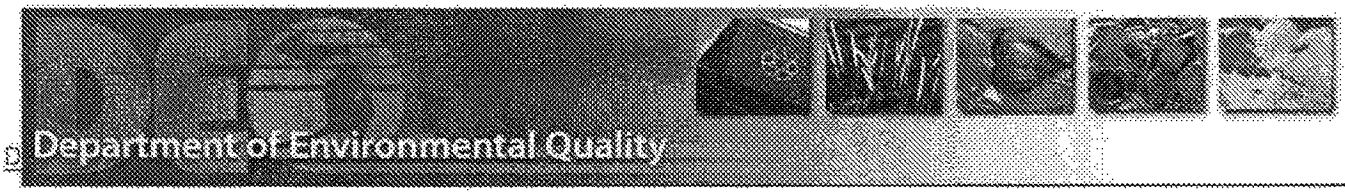
Commendations include:

- The Region commends MDEQ for its continued efforts to effectively utilize its limited and decreasing resources to maintain public health protection; however, the Region is very concerned about how the continual decrease in resources will impact the PWSS program in the future.
- MDEQ has effectively used DWRF set-aside funds to temporarily maintain the PWSS program to protect the public's drinking water, and to promote source water protection efforts.
- MDEQ is commended for exceeding all FY 2010 enforcement commitments. In addition, MDEQ committed to address 174 Significant Non-compliers or Priority systems in FY 2010, and MDEQ addressed 286 Priority systems under the commitment, which is commendable.
- MDEQ is commended for exceeding their sanitary survey commitment by reporting that 96.3% of surface water CWSs had a sanitary survey conducted within the past 3 years. MDEQ expects to complete 100% of required NCWS sanitary surveys in FY 2011; the State has completed 98% to date.
- The Region is supportive of the progress made to conduct the necessary transition of the NCWS data management system to SDWIS-State.
- The need to fully implement eDWR and CDS for all rules continues, but progress is also noted.
- Timeliness of, and quality of the State's quarterly data submittals continue to be an issue, though progress has been noted. The NCWS program has upgraded to FedRep 3.0 which will improve the accuracy of the State's data submittal.
- MDEQ has begun to report GWR monitoring/reporting violations.
  NCWS reporting of locational data has improved to approximately 86% of all NCWS and 89% of NTNCWSs.
- CWS data management has automated the Lead and Copper Rule under SDWIS-State's CDS module. MDEQ is encouraged to continue to work to incorporate other rules.
- CWS program is very timely with its adoption of the latest versions of SDWIS-State. MDEQ is currently using SDWIS-State 2.2.2.
- MDEQ's progress in developing affordable delineations through the use of MIGWHP is commendable. MDEQ's 50/50 grant program for water systems to develop wellhead protection plans continues to make progress.
- MDEQ district engineers are encouraging systems to consider SWP as part of a typical operation and maintenance program during their sanitary survey visits. The Region encourages MDEQ to incorporate other sustainability activities into sanitary surveys, such as increased water and energy efficiency and asset management, in FY 2011 and FY 2012. The Region encourages the State to promote Asset Management practices during sanitary survey and routine surveillance visits.

<u>Recommendations include</u>:

- While the increased PWSS program disinvestments and the DWRF funds have temporarily sustained the drinking water program, a permanent source of funds must be identified to support the program.
- Even though the SDWA and CWA programs are now located in separate Divisions as a result of the recent reorganizations, Region 5 strongly encourages continued coordination between the SDWA and CWA programs to maximize the use of funding and public health protection.
- The Region strongly supports continued funding and providing resources for a routine surveillance program and technical assistance to public water supplies.
- The Region strongly supports MDEQ's plans to allocate the necessary resources to ensure that all NCWSs receive a sanitary survey within the required 5-year timeframe.

- MDEQ needs to continue to improve its reporting of sanitary surveys to SDWIS-FED, particularly the ground water system sanitary surveys now required by the GWR. The NCWS data management system has upgraded to FedRep 3.0, thus reporting may begin as early as May 2011.



How Does Lead Affect Our Environment?

Agency: Environmental Quality

not helpful
Not a ODWMA site

Lead released into the environment makes its way into the air, soils, and water. Lead can remain in the environment as dust indefinitely. The lead in fuels contribute to air pollution, especially in urban areas. Soils near highways, freeways, and smelting facilities have higher levels of lead than soils in other areas because of their exposure to lead dust, which accumulates over time. Plants exposed to lead can absorb the metal dust through their leaves. Plants can also take up minimal amounts of lead from the soil. Other ways lead can enter the environment are through mining practices, steel industry, crop enhancers, improperly disposed of batteries, or improperly stored metal parts such as machinery that can break and leave pieces or shavings which may leech into the environment. According to the U.S. Centers for Disease Control (CDC), the State of Michigan is a high-risk state for lead hazards.

Links to DEQ's Public Outreach to Reduce Exposure to Lead in Water
Actions You Can Take To Reduce Lead in Your Drinking Water
Requirements for Community Public Water Systems
Requirements for Noncommunity Public Water Systems

Links to DEQ's Information About Lead in the Air
Ambient Air Data from AQD Annual Report
Lead Hazard Report: Michigan

Links to DEQ's Information About Lead in the Soil
Best Management Practices at Active Shooting Ranges

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City of Flint Water
Action Steps for Week of October 19-23

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Update 2004 letter to EPA	DEQ	Dana DeBruyn	This Action Step has been incorporated as part of the After Action Plan (Action Step #4)
2.	Schedule Flint Water Treatment Plant tour	DEQ and Flint	George Krisztian	Scheduled for 10/23/15 at 11:30 a.m.
3.	Figure out number of samples from schools and child care facilities	DEQ	Jim Sygo Pat Cook Steve Busch	1,300 samples (13 schools and 100 samples per school)
4.	Conduct After Action Plan	DEQ	George Krisztian	Initial meeting to be scheduled for week of 10/19/15
5.	Introduce legislative changes to Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone George Krisztian Sonya Butler	Draft language submitted to Maggie Pallone for review
6.	After Action Review Panel	DEQ	Madhu Anderson George Krisztian Karen Tommasulo	
7.	Staff hiring plan	DEQ	Jim Sygo Maggie Pallone George Krisztian	
8.	$1 million for DEQ Laboratory billing code	DEQ	Maggie Pallone George Krisztian	
9.	Finalize fiscal year 2017 budget request	DEQ	Maggie Pallone George Krisztian	

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
10.	Develop letter to schools	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	This Action Step has been incorporated into Action Step #13
11.	Finalize sampling protocol	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	Revised draft sampling protocol shared with DLARA, DHHS, EPA, and Genesee County Health Department on 10/19/15 for comment
12.	Confirm school sampling logistics	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	
13.	Meeting(s) with school staff/management	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	A meeting with the 10 remaining schools is tentatively scheduled for the week of 10/26/15
14.	Meet with DHHS and discuss all lead education material for schools	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	DEQ has contacted DHHS to schedule a meeting
15.	ODWMA staff observe a DLARA plumbing assessment	DEQ and DLARA	Steve Busch Pat Cook Mike Prysby	Initial plumbing assessment is scheduled for 10/23/15; sampling to occur on 10/24/15
16.	Develop sample form and chain of custody document	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	DEQ Laboratory has created a fillable PDF form for use in the school sampling protocol

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
17.	Review corrosion control treatment plan and get any EPA comments	DEQ and EPA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Conference call with EPA held on 10/20/15 to discuss comments
18.	Review construction permit application and issue construction permit for phosphate equipment	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	Construction permit is in process
19.	Review Standby Operation of Flint Water Treatment Plant with city of Flint	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	
20.	Provide city of Flint updated monitoring schedule based on Detroit Water and Sewerage Department (DWSD)/Great Lakes Water Authority (GLWA) service	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	
21.	Contact city of Flint and Genesee County Health Department daily for DWSD connection status updates	DEQ, Flint, and Genesee County Health Department	Jim Sygo Steve Busch Pat Cook Mike Prysby	Switch to DWSD completed on 10/16/15; city of Flint will let DEQ know if they run into any unforeseen issues
22.	Work with Karegnondi Water Authority (KWA) and other agencies to address bottleneck issues	DEQ and KWA	Jim Sygo Steve Busch Pat Cook Mike Prysby	
23.	Verify city of Flint distribution operations under DWSD/GLWA service	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
24.	Contact city of Flint for Service Line Record status update and obtain a copy of the records to date	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	
25.	Provide DHHS with any available cross-reference information	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
26.	Develop childcare facility guidance or review DHHS related materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	DEQ has contacted DHHS to schedule a meeting

TAKING ACTION ON FLINT WATER

FLINT WATER

State Encourages Food Establishments to take Advantage of Free Water Safety Inspections

Contact: See contact information below.

Local and State Leaders Showcase Water Assessments Done at Flint Food Establishments

February 5, 2015

Flint, Mich. – In an effort to support Flint food-based businesses, Lt. Gov. Brian Calley, along with local and state food regulators and business development officials, provided a behind-the-scenes look at how the Michigan Department of Agriculture and Rural Development (MDARD) and Genesee County Health Department are working with local food establishments to conduct water assessments and ensure food safety precautions are in place.

"Flint has hundreds of restaurants, retail food markets and food processors committed to serving its residents safely," Calley said. "These establishments can now receive free assessments from MDARD and the Genesee County Health Department to ensure food safety precautions are in place."

"In response to this emergency and the need to assess lead levels in water being used at Flint food establishments, MDARD has mobilized 14 food inspectors, working full-time to conduct risk-based compliance assessments and verify adherence to current water source requirements," said MDARD Director Jamie Clover Adams. "MDARD inspectors are assisting the Genesee County Health Department in conducting the sampling and inspections, allowing the health department to focus its efforts on checking other priority facilities in its jurisdiction, including childcare facilities."

Food establishments must take extra precautions to protect food safety during the Flint water emergency. These precautions include having the water tested by an accredited laboratory to prove it is safe to use; installing approved water filters, as needed; flushing unfiltered faucets and hard-plumbed equipment on a daily basis; or using commercially bottled water for all cooking, cleaning/washing and drinking.

"Flint's restaurants and other food establishments are demonstrating they are taking the necessary precautions to reduce potential food safety risks associated with Flint water," said Mark Valacak, Health Officer, Genesee County Health Department. "Safe food preparation and handling is the cornerstone of any food business's success, and we are dedicated to working cooperatively with MDARD and the food service establishments we regulate to ensure the safety of our food supply."

The State of Michigan is covering the cost of water sample testing for food establishments on the City of Flint water supply.

"The restaurants, bars, cafes and other food businesses, like the Flint Farmers' Market, in Flint are the backbone of the city's culture and economic success, and help define who we are as a community," said George Wilkinson, Group Vice President, Flint & Genesee Chamber of Commerce. "Whether a relative new-comer or a well-established dining institution, we need to do whatever we can to support Flint food businesses and ensure their success."

Flint has a total of 633 licensed food businesses, including restaurants, food processors and retail grocery stores. Assessments have been prioritized according to risk, with those in known high-lead areas taking first priority, and by request from food establishments. Food businesses who have not yet had an assessment or free water sample testing can call MDARD's Call Center at 800-292-3939 to schedule an appointment.

As of Feb. 4, MDARD has completed approximately 225 initial assessments of food businesses and has begun doing follow-up assessments. If the businesses are taking the required precautions, they are determined to be in compliance with state and federal food regulations. A list of food businesses determined to be in compliance with current water use regulations is available at www.michigan.gov/flintwater. The list is updated regularly.

Flint food businesses not included on the list are not necessarily out of compliance with Michigan food regulations. Some businesses have not yet received a compliance assessment from food inspectors.

Initial water samples taken at the facilities were "first-draw" samples, taken when the water had not been in use for at least six hours. If first-draw samples showed any lead levels, follow-up samples are being taken. MDARD will continue to work with businesses to make sure they are in compliance with water use requirements and assist them in getting water test sample results below detectable levels.

For more information, or to schedule a food establishment water assessment, contact MDARD at 800-292-3939.

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NOTE: ALL MEDIA INQUIRIES ARE BEING HANDLED BY THE JOINT INFORMATION CENTER AT 888-EMD-TODAY (888-363-8632). FOR FLINT WATER EMERGENCY DONATION INFORMATION, GO TO www.helpforflint.com.

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MICHIGAN DEQ PUBLIC WATER SYSTEM SUPERVISION (PWSS) PROGRAM

Workplan Summary and FY 2011 End-of-Year Evaluation

Contacts:

Michigan DEQ Public Water Supply Section Chief: Carrie Monosmith, monosmithc@michigan.gov, (517) 241-2853

U.S. EPA Region 5 Michigan State Program Manager: Jennifer Kurtz Crooks, crooks.jennifer@epa.gov, (312) 886-0244

Federal funding used: PWSS grant; Drinking Water State Revolving Fund (DWSRF) Set-asides: 1) Small System Technical Assistance set-aside, 2) Program set-asides of PWSS, Operator Certification, Source Water Protection, Capacity Development, and 3) Local Assistance set-asides that includes Wellhead Protection.

FY 2011 End-of-Year Evaluation Synopsis: In spite of diminishing resources for the PWSS program, Michigan DEQ continues to meet requirements to maintain primacy of the drinking water program, and public water systems continue to maintain high compliance rates with drinking water regulations. Analysis of the various programs within Michigan's drinking water program (below), and the data gleaned from implementation of these programs (see attached Measures and Indicators), show that public health protection is the top priority. There is a direct correlation between the up-to-date sanitary survey visits to 11,000 public water systems, low violation rates, innovative programs to ensure compliance; and the dedicated staff in the drinking water program and at the Local Health Departments. Staff resources must be maintained to ensure the types of results discussed in this evaluation.

Rules and Primacy: Michigan DEQ is implementing all of the drinking water rules, except where noted as discrepancies in the linked table. Michigan DEQ does not yet have full primacy for Long-Term 2 Surface Water Treatment Rule (LT2SWTR), Stage 2 Disinfection/Disinfection By-Products Rule (Stage 2 DBPR), Ground Water Rule (GWR), Lead and Copper Rule Minor Revisions (LCRMR) and Short-Term Revisions (LCRSTR), but has interim primacy while these rules are under EPA review. Region 5 is tracking State reporting of new rule violations for the above rules. Currently, not all GWR violations are getting into the Federal database, SDWIS, for Community Water Systems (CWS) or Noncommunity Water Systems (NCWS), due to data management issues in both programs. The CWS data management system began entering the remaining GWR violations in August 2012, due to launch of SDWIS 3.1. A plan to temporarily upgrade WaterTrack to input GWR and other new rule violations into SDWIS is currently being developed. NCWS GWR violations may be entered by mid-FY 2013.

As of July 2012, Michigan DEQ reported:

- No LT2SWTR violations;
- 19 GWR violations;
- No Stage 2 DBP violations; and,

- No LCRSTR consumer notification Monitoring/Reporting (M/R) violations. (Prior to FY 2013, Michigan DEQ had disinvested in this activity.)

Region 5 will continue to determine whether primacy applications are completed, track primacy submittal/review for all rules, and provide comments on draft rules (if requested), and track reporting under new rules.

The Region would like to thank MDEQ for its innovative design and diligent work to implement a pilot project to deliver the Consumer Confidence Report electronically.

Sanitary Surveys: Michigan DEQ will maintain a baseline core of individuals with the technical expertise needed to perform sanitary surveys. Michigan DEQ will ensure that sanitary surveys are conducted periodically that, at a minimum, meet frequency requirements specified by rule. The Local Health Departments (LHD) are under contract by the State to perform sanitary surveys at all noncommunity water systems. The LHDs are reviewed by the State periodically, but not less than annually. Region 5 will track State commitments to conduct sanitary surveys within the Federally required intervals. The July 2011 numbers report that:

- SURFACE WATER SYSTEMS: 95% (282/297) of the sanitary surveys at Subpart H systems were completed between CY 2008 and CY 2010. (State committed to 94%) Commendable!
- GROUND WATER SYSTEMS: CWSs have not been able to report ground water sanitary surveys due to data management issues (launch SDWIS 3.1) which are being resolved. Reporting sanitary surveys for CWS systems will begin in FY 2013. For the time period 2006-2010, ground water sanitary surveys for TNCWSs and NTNCWSs were not input into SDWIS. However, for the time period 2007-2011, this data was input during FY 2011, and reported at 97.4% and 97.8%, respectively. Commendable!

A downward trend in the number of NCWS sanitary surveys older than 5 years began ten years ago, and at the end of FY 2011, it was measured at 1%. This trend is most likely the result of: MDEQ's annual evaluation process when any survey backlog is highlighted; and, national/Regional emphasis not to exceed the 5-year mark which has led to closer scrutiny by the LHDs and the State. The State's practice of distributing each LHD's progress to all LHDs quarterly, may contribute to maintain or continue to decrease the number of sanitary surveys older than 5 years. Region 5 applauds MDEQ's efforts!

Laboratory Certification: The State is expected to maintain: (1) certification for the principal State laboratory, (2) a certification program to certify commercial labs within the State, and (3) a process for ensuring capacity to analyze at the principal State lab or commercial labs for all parameters that are required to be sampled in the State. Laboratory certification responsibilities in Michigan are undertaken by the Michigan DEQ Laboratory and radiological parameters are analyzed by the Wisconsin State Lab of Hygiene. Michigan DEQ ensures all results used for compliance with the SDWA are analyzed by certified labs. Michigan DEQ agrees to ensure all laboratories that produce results for compliance with the SDWA are recertified at least once every three years and will meet all requirements of 40 CFR parts 141 and 142.

In March 2012, the Region 5 Certification Team conducted an on-site review of the Michigan Laboratory Certification Program. Findings include the need for improvement in communication with the Drinking Water Program staff. Also, the Region has concerns about the limited Laboratory Certification staff to handle 172 commercial laboratory audits.

Michigan DEQ has been developing eDWR, a data system that will report data from private laboratories to the State. The March 2012 Laboratory audit found that a large portion of the noncommunity sample data from private laboratories is hand-entered by LHD staff, and the community program is having issues with mapping and importing data into SDWIS/State, so data must also be entered into program databases manually. Michigan DEQ is strongly encouraged to focus IT resources to complete eDWR. Regarding progress in completing eDWR, development is still underway. A FY 2014 completion date is planned. Upon completion, eDWR will improve the timeliness issue of State's receipt of private labs results, of reporting positives to the State promptly, and improve data quality.

Compliance and Enforcement Management: Region 5 tracks State commitments under the OECA measure SDWA02 and updates Michigan DEQ quarterly. In July 2010, Michigan had 26 systems with scores of 11 or more as measured by the Enforcement Tracking Tool (ETT). Michigan's 2011 commitment was to address or resolve 20 systems. The July 2011 Freeze showed 55 systems addressed; 25 from the original 26 plus an additional 30 was more recently greater than 11. Commendable!

Michigan DEQ referred 1 NCWS for enforcement to Region 5 in FY 2011. This was a reduction from 4 referrals in FY 2010. In FY 2011, no Administrative Orders were issued and Administrative Penalties were issued to only 2 CWSs for M/R violations. Bilateral compliance agreements (BCAs) were issued to only 6 NCWSs (2 for Arsenic Maximum Contaminant Level (MCL) violations and 4 for TCR M/R violations). Administrative Penalties were issued to 68 NCWSs for M/R violations by 9 LHDs.

Data Management and Reporting: Michigan DEQ maintains a data management system that tracks requirements for all rules and serves as the central store of data reported by laboratories, field offices and LHDs. The CWS program uses SDWIS/State 3.0 and FedRep 3.3, and the NCWS program uses WaterTrack and FedRep 3.0 to report actions and sample data to EPA quarterly, and inventory data at least annually in accordance with 40 CFR 142.15. The CWS program uses SDWIS/State 3.1. CWSs have not been able to report ground water sanitary surveys nor report all new rule data for Stage 2 DBPR, GWR, LT2SWTR and LCRSTR, due to data management issues related to the launch SDWIS 3.1. Now that SDWIS 3.1 is in production, reporting for all new rule requirements is possible for CWSs. The NCWS program is continuing its use of WaterTrack, as it prepares to move its data to SDWIS/State in 2014. Since WaterTrack is unable to report new rule data for the above 4 rules, the Region would like to work with the State to develop an interim reporting method to ensure violations for these rules are entered into SDWIS prior to 2014. As of June 2012, CWS program is using CDS for TCR, LCR and some Stage 1 monitoring; and plan on using CDS for Stage 2 TTHM/HAA5 reporting beginning in FY 2013.

The reporting schedule for States to the national database, SDWIS/Fed-ODS, is quarterly. If the data is not reported within 60 days, Region 5 raises the issue to the State Director's attention. Michigan DEQ continues to meet most of the quarterly reporting dates. Great improvement!

It is also important for the State to correct identified errors in the database in a timely manner. The Region requests that the State prioritize correcting inventory errors, open-ended violations linked to SOX codes in ODS, and reporting missing NTNCWS locational data.

Region 5 is tracking late reporting of TCR and nitrate violations. Michigan DEQ timeliness in reporting these violations has improved from 2010 to 2011. In 2010, 90.8% of the TCR violations and 92.3% of the nitrate violations were reported on-time. These percentages improved to 95.1% and 99.0%, respectively in 2011. Commendable!

Operator Certification: Michigan DEQ established and implemented minimum professional standards for the operation and maintenance of public water systems to ensure that trained and certified professionals are overseeing the treatment and distribution of safe drinking water and to promote compliance. Michigan DEQ provides documentation to EPA annually, September 30th each year, to show the ongoing implementation of the operator certification program to avoid 20% withholding of the DWSRF grant. The FY 2012 Operator Certification report was received on September 25, 2012. The expense reimbursement grant (ERG) ends on December 30, 2012. Michigan DEQ is planning to expend their remaining ERG funds by this date. Any remaining funds will be deobligated in January 2013 to EPA.

Capacity Development: Michigan DEQ ensures that new and existing CWSs/NTNCWSs can demonstrate technical, managerial, and financial capacity to operate in compliance with Federal and State regulations. Michigan DEQ provides documentation to EPA annually, December 30th each year, to show the ongoing implementation of the new systems program and the existing systems strategy to avoid 20% withholding of the DWSRF grant. Activities taken by the Michigan DEQ to strengthen system capacity include:

- Two control points, construction permit and final inspection, are used to ensure that new public water systems demonstrate technical, managerial, and financial (TMF) capacity.
- Capacity assessment of existing systems is conducted through sanitary surveys, on-site surveillance visits and the construction permit process, where one-on-one technical assistance/consultation is provided by Michigan DEQ field staff.
- Michigan DEQ conducts other programs and activities that are implemented in the State to assist systems gain TMF capacity. The State also promotes USEPA tools such as CUPSS, to assist systems gain TMF capacity.
- The State assists existing water systems improve their financial capacity by conducting financial assessments for systems with less than 10,000 population that request assistance(funded through Technical Assistance set-aside), and for systems with greater than 10,000 population that request assistance(funded through the Capacity Development set-aside).

Ground Water and Source Water Protection: Michigan DEQ annually reports the number of CWSs with Source Water Protection (SWP) plans and the number of CWSs implementing SWP measures, due September 25, 2012. Even though source water protection is voluntary in Michigan, Michigan DEQ came very close to meeting its 31% target (30.8%) in FY 2011 to minimize risk at CWSs through source water protection for both CWSs and their population served. Michigan DEQ recommends that SWP plans be updated every 3 to 5 years, especially in prioritized areas.

Michigan DEQ is currently working towards updating source water assessments using the Michigan Ground Water Management Tool (MGMT), an innovative tool that uses information from the Wellogic water well record system to perform particle tracking and delineate WHP areas. Eventually, Michigan

DEQ would like to use this tool to identify the wellhead protection area for all community and noncommunity nontransient public water supplies in Michigan. This effort is also contributing to the update of source water assessments with a shift in focus from isolation areas for wells to the wellhead protection area. In the future, it is anticipated the MGMT will be used to complete source water assessment reports for new public water systems. The source water assessments can then be used by the Michigan Rural Water Association to write SWP plans. Currently, Michigan DEQ is updating SWAs that were completed more than 10 years ago, for systems in the Kalamazoo, Grand Rapids, and Cadillac Districts (3 out of 8 districts in Michigan).

Michigan DEQ has a Wellhead Protection (WHP) Program which offers a 50/50 grant to CWSs to develop a WHP plan. This program has been very successful, though funding for this program has decreased over the past 12 years. Using the WHP 50/50 Grant Program as a template, Michigan DEQ developed a Surface Water Intake Protection (SWIP) Program that incentivizes participation in the development of a SWIP plan with 50/50 grants (through the Local Assistance Capacity Development set-aside), though implementation has been hindered due to a lack of resources. Excellent innovative thinking!

Measures and Indicators: There are multiple national measures in the National Program guidance that support the "water safe to drink" subobjective 2.1.1 in EPA's strategic plan, and Region 5 is also tracking several other measures, including those in the Logic Model Reporting Tool, Regional Shared Goals, and Regional High Priority queries. The most recent data for Michigan for each of these measures are attached, some of which have been described in this work plan summary; and are also available via the "Measures and Indicators" link.

Resources and Expertise: Michigan DEQ maintains a baseline core of individuals with the technical expertise to carry out all mandatory components of the PWSS program (including engineering plan and specification review and emergency response.) Contracts with the LHDs ensure implementation of the SDWA at NTNCWSs and TNCWSs, with oversight provided by Michigan DEQ. Michigan DEQ develops and implements a plan to provide adequate funding to carry out all functions of the PWSS program. Region 5 tracks the progress related to State and EPA efforts to obtain additional resources necessary to enable Michigan DEQ to engage in resolving program discrepancies.

Talking Points on Freeman Announcement

Q: How do we describe the home tests?

A: The home tests are a surveillance-level screening tool. It is the same test used by the state to comply with the federal Lead and Copper Rule.

Q: SO, a safe reading doesn't mean my water is safe?

A: A low reading means there are no fixture-related issues. This screening may not catch impacts of a lead service line to the home. If a homeowner isn't sure whether they have a lead service line, the best way for homeowners to be absolutely sure is to have a certified plumber inspect their home.

Q: Does home plumbing inspection mean they dig up my yard?

A: Usually, no. A good plumber can usually assess the service line from the point of entry to the home.

Q: Was the inspection of the schools done with a different kind of testing? If so, how so?

A: Yes, the testing at the schools is a very thorough protocol designed to first determine if there are fixture-specific issues, then look deeper into the system to identify possible lead plumbing issues.

Q: What was learned by the testing at Freeman Elementary?

A: We identified 9 of 31 sites where the plumbing clearly was imparting lead into water. Importantly, we did repeated draws of the water at these spots over several minutes, and saw lead levels drop dramatically. This means the lead is in the fixtures, not in the water lines. It means the fixtures need to be addressed in some way – flushing for several minutes will help, but replacement of these fixtures offers a more permanent solution. And it means the water at Freeman is safe at 22 of the 31 sites inspected, which is of some reassurance to school officials.

Q: The City is now using water from Detroit. When will the water be free from lead again?

A: The water from Detroit is treated with phosphates, which coat the insides of lead home service lines and will reduce lead impacts. The City also will be adding additional phosphates to develop this coating more quickly, but it could take months for corrosion control to be achieved throughout the system. It is important to note that, even in systems where optimal corrosion control exists, lead components in home plumbing can still cause lead exposure. Removing lead from home plumbing is the only permanent solution to address lead in home water supplies. And testing is the best way to get an accurate sense of one's exposure. In Flint, blood testing for children is free, and surveillance testing of water for any resident also is free.

Flint Phosphate Calculations

Chemical will be 75% NSF certified Phosphoric acid

75% acid has a density of 13.17 #/gal (5,974 g/gal)

Of this 75% is Phosphoric acid (H_3PO_4) = 4,480 g H_3PO_4/gal

Molecular weight of H_3PO_4 is 97.9913 g/mole

Moles H_3PO_4 / gal = 45.72

Moles H_3PO_4 = Moles Orthophosphate (PO_4^{-3}) = Moles Phosphorus (P)

Species	Molecular Wt.	Moles / gal	g/gal
H_3PO_4	97.9913	45.72	4,480
PO_4^{-3}	94.9676	45.72	4341.92
P	30.97	45.72	1407.72

Proposed Operating Parameters

Assumptions per DEQ:

- City of Detroit residual is 0.39 mg/l as P
- MDEQ wants Flint to maintain a residual of approximately 1.0 mg/l as P
- Feed pump capacity should be sized for a max dose of 2.0 mg/l as P

	Plant Flow	Dosage as PO_4^{-3}*	Dosage as P
Maximum	25 MGD	6.13 mg/l	2.0 mg/l
Average	16 MGD	3.07 mg/l	1.0 mg/l
Minimum	8 MGD	1.53 mg/	0.5 mg/l

*Equivalent dosage to P dosage

Feed Rate Calculations

Maximum feed rate (Max Flow × Max Dosage)

25 MGD × 3782 g/gal H_2O × 2.0 ppm / 1,408 g/gal = 134.30 gpd Phosphoric Acid

Average feed rate (Avg Flow × Avg Dosage)

16 MGD × 3782 g/gal H_2O × (1.0 ppm – 0.39 ppm) / 1,408 g/gal = 26.21 gpd Phosphoric Acid

Minimum feed rate (Min Flow × Min Dosage)

8 MGD × 3782 g/gal H_2O × (1.0 ppm – 0.39 ppm) / 1,408 g/gal = 13.10 gpd Phosphoric Acid

Storage Requirements

30 days supply at average flow and dosage = 26.21 gpd × 30 days = 786 gal.

Assuming the use of 275 gal semi-bulk totes, 3 totes required (recommend 2 in service, 1 spare)

Director's Summary

Partners and Key Figures

US EPA
Susan Hedman: EPA Region 5 Administrator
Bob Kaplan: EPA Region 5 Deputy Administrator and Task Force Chair
Darren Lytle: ORD Corrosion Control Expert
Mike Schock: ORD Water specialist
Tom Burke: Office of the Science Advisor and Deputy Administrator of ORD
Miguel Del Toral: Data Management and Technical Support Program
Jennifer Crooks: State Program Development and Implementation
Tom Poy: Ground Water and Drinking Water

DHHS (Linda Dykema)
DLARA (Shelley Edgerton)
City of Flint Mayor Karen Weaver
City of Flint Administrator Natasha Henderson
GCHD (Jim Henry, Mark Valacak)
Dr. Mona Hana Atisha (Hurley Medical)
Mark Edwards
Harvey Hollins
Flint Community Schools Superintendent Bilal Tawwab
Dr. Eden Wells
LAN (Engineering Contractor for City of Flint)
Pastors
MDOT

DEQ Staff
Jim Sygo Senior: Senior Deputy Director and Liaison to the EPA task force
Mahdu Anderson: Deputy Director and Liaison to the Governor's Task Force
Maggie Pallone: Deputy Director Policy and Legislative Affairs
George Krisztian: Flint Action Plan Coordinator and Laboratory Director
Steve Busch: Lansing District Coordinator and Environmental Manager
Mike Prysby: Environmental Engineer
Adam Rosenthal: Environmental Quality Analyst
Liane Shekter Smith: Former ODWMA Chief, Currently serving as assistant to Jim Sygo
Karen Tommasulo: Public Information Officer
Eric Shaw: Website and other media content

Overview of current Status

- GCHD still has a health emergency declaration in place (Issued October 1, 2015)
- Funding for providing Flint with water from DSWD is in place through the end of June 2016
- KWA will likely not come on line until September or October at the earliest
- EPA is taking a very conservative approach and is recommending that the city of Flint operate the WTP for an indeterminate amount of time sending the water to waste to demonstrate the ability to generate water that will not adversely affect the infrastructure

- DEQ must support recommendations by EPA
- Flint does not have the money to comply with EPA's recommendations
- The city of Flint has hired a contractor to identify and confirm 150 sampling points within the Flint distribution system that comply with the requirements of the lead and copper rule
- Flint is required to provide a minimum of 60 samples for each 6 month monitoring period, the latest period began on 01/01/16.

What could the DEQ have done better?

-Rule #1
-Tone
-Failure to do homework
-Focus on technical compliance, culture of minimalism
-Relationship with EPA

Concerns

-Director Creagh needs to read the Mark Edwards website and Wiki Page to understand the external narrative
-The city of Flint is going to need significant funding in order to deal with an infrastructure that is aging and was built to serve 250,000 in a city whose population is 99,000
-The KWA is not going to be completed on time and we will need help from MDOT to help clear some bottlenecks by working with the County Road Commission
-The media coverage has been very anti DEQ, the change in leadership will be the best opportunity to begin changing the narrative
-DEQ must continue to acknowledge the situation and move forward with positive actions
-The lead situation is not unique to Flint

Recommendations

-Need to create a positive message for moving forward focused on actions and solutions
-Need to continue work on the 6.9 million supplemental ask
-Need to discuss the culture and the morale in ODWMA
-Need to meet with Mayor Weaver to introduce Director Creagh
-Need to meet with Harvey Hollins to review plans going forward
-Need to develop a state wide school testing program
-Need to continue work on revolving loan program for lead service line replacement
-Need to meet with Dr. Mona Hana Atisha to establish a working relationship
-Need to meet with GCHD to determine what needs to happen to lift the health emergency
-Need to seek assistance from DNR or MDARD Coms office to assist with DEQ coms staff shortage
-Need to hire a replacement for Brad Wurfel
-Need to work with Pastors to begin rebuilding trust
-Need to work with MDOT to see what can be done to speed up construction (Freeze/Thaw)

Governor's 10 Point Plan

Partnering Plan

Flint Drinking Water Action Plan Update

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

Key Actions:

On December 3, 2015, DHHS released blood lead level testing data. The data covered the time frame between January 1, 2010, and November 13, 2015. The data was broken down by population set and by demographic. The population sets included the state of Michigan as a whole, Genesee County as a whole, and the city of Flint ZIP Codes 48501 to 48507. The demographic sets broke the populations down into the age groups of: "Children younger than 6 Years Old," "Children 6 to 17 Years Old," "Adults 18 Years and Older," and "Total Number of People of All Ages Tested."

On December 3, 2015, the DEQ released the lead in drinking water data and final report for Eisenhower Elementary School. The findings in the report were very similar in nature to those found in the report for Freeman Elementary School. There were a number of fixtures and plumbing immediately adjacent to fixtures that were imparting lead into the water. The report recommends replacement of these fixtures and related plumbing.

On December 4 and 5, 2015, staff from the DEQ and DLARA conducted a plumbing evaluation and subsequent sampling of the fixtures used for drinking water consumption at Potter Elementary School in Flint. There were a total number of 288 samples taken at 57 different locations throughout the school.

Positions:

There are no new positions to report since last week.

Concerns:

There are no new concerns to report since last week.

Significant Events:

On November 30, 2015, Director Dan Wyant and George Krisztian met with water quality expert Dr. Joan Rose of Michigan State University. The purpose of the meeting was to discuss the situation in Flint and to seek guidance on approaches for addressing the issue. Dr. Rose expressed that she felt there were three different fronts necessary to address the issue. These were to create a "Trust Plan," a "Communications Plan," and a plan to "Get the lead out." Dr. Rose provided several different examples of communities that had undergone similar challenges and what approaches worked and what approaches did not.

On December 3, 2015, representatives from the Governor's office, DEQ, and Office of Urban Initiatives met with Flint City Mayor Karen Weaver and members of her transition team. The purpose of the meeting was primarily introductory in nature, and the conversations were at a high level discussing the needs of the city as well as how communications with the residents of the city could be improved. There was also discussion of the lead testing results, both for home owners and in the schools. There was particular interest in the sampling protocol that was used to obtain samples in the schools. Overall, the conversation was very positive, with everyone agreeing that a coordinated effort was necessary to be able to effectively address the lead issue.

On December 3, 2015, Director Dan Wyant was interviewed by Lori Jane Gliha for a segment on America Tonight. The questions mainly focused on what had happened in the past and were tough. The responses echoed the message that the DEQ empathizes with the residents of Flint; we are committed to bringing about a resolution; we have a plan; we are moving forward; and we recognize that we need to rebuild trust in the community.

On December 4, 2015, representatives of the DEQ (Jim Sygo, Karen Tommasulo, and George Krisztian) met with Flint Mayor Karen Weaver and other city officials for the weekly coordination meeting. Calling into the meeting were representatives of DHHS and DLARA. The blood lead data that DHHS released the previous day was discussed, and Dr. Eden Wells provided detailed comment on the data. There was also detailed discussion regarding the Revolving Loan Fund and how it might be utilized to help address the issue of lead service line replacement.

On December 4, 2015, representatives of the DEQ (Jim Sygo, Karen Tommasulo, and George Krisztian) met with Flint Community Schools Superintendent Bilal Tawwab. The main topic of discussion was a review of the lead in drinking water data obtained to date. Superintendent Tawwab was informed that the schools, in general, were all following a similar pattern in that the sources of lead appear to be coming primarily from fixtures and the adjacent plumbing. Superintendent Tawwab indicated that his office has already made the decision to follow all recommendations in the reports. It was also agreed that a monthly meeting would be helpful to ensure that the process kept moving forward. In addition, there was discussion about a document that the DEQ would create that would explain what constituted a part per billion or ppb. A draft document without graphics was given to Superintendent Tawwab, and he indicated that the final version would be a very helpful aid to parents and students.

Changes from Previous Report:

- Draft sampling instructions were developed for lead and copper compliance sampling, incorporating comments by the U.S. Environmental Protection Agency (EPA). The revised document is being sent back to the EPA for final comment.

- DEQ staff met with DHHS staff to assist with development of a phosphate fact sheet. DHHS is the lead on this and will be submitting a revised version to the DEQ for final comment. This document is being developed to answer home owner questions regarding the safety of the addition of phosphate to the water received by the city of Flint from Detroit.

- Staff from the DEQ provided a "Standby Operations" letter to the city of Flint. The purpose of the letter is to define what practices are to be utilized in the event of an emergency.

- Staff from the DEQ followed up with the city of Flint on the status of the installation of corrosion control treatment. Pumps were installed on November 30, 2015. It is anticipated that the startup of the system will begin during the week of December 7, 2015.

Other Item:

Attached is the draft document, "What is a Part per Billion."

Prepared by: George Krisztian, Flint Action Plan Coordinator
Laboratory Director
Department of Environmental Quality
Telephone: 517-284-6719
Cell: PPI
December 7, 2015

What is a Part per Billion?

1 dollar in a stack of 1 dollar bills 62 miles high

1 dime in a stack of dimes 800 miles high

1 penny in 10 million dollars

1 second in 32 years

1 foot of a trip to the moon

1 inch of a trip from the North Pole to the South Pole

1 apple in over 10,000 truckloads

1 drop of water in 850 aquariums 20 gallons in size

1 single pitch from every game, of every major league baseball team, played over the course of 700 seasons

City of Flint, Michigan
Office of the City Administrator

Memo

To: Dayne Walling, Mayor

From: Natasha L. Henderson, City Administrator

cc: President Freeman and Councilmembers

Date: October 20, 2015

Re: Water Filtration Plant and Water Distribution Internal Review

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Water Filtration Plant and Water Distribution Systems Overview

The City of Flint's water filtration plant and distribution system have experienced many challenges over the past two years and it is of grave concern that we reflect upon the decisions that have been made and understand how we will proceed in the future. First, and foremost the City will conduct an internal review of the steps that were taken in 2013 when the agreement with Karegnondi Water Authority (KWA) was signed.

In the wake of recent water concerns, I have developed a proactive and comprehensive plan showing the City's commitment to deliver high quality water, address its aging infrastructure, and maintain a qualified staff. I am outlining a series of steps that the city will take to not only ensure that these goals are met but a plan that is designed to start rebuilding community trust through action and transparency.

In addition, with the assistance of the EPA Task Force, Michigan Department of Environmental Quality, and Safe Drinking Water Technical Advisory Committee, the following steps are meant to go into effect as quickly as possible with all goals being accomplished by the time KWA begins delivering raw water.

- Independent review
- Processes & Testing
- Training

- Technology
- Communication
- Lead Lines
- Capital Improvements

Independent Review

We will seek to commission an independent source to review the technical and operational steps that occurred from the time the City signed on to the KWA to present. This is meant to internally perform an after action review in order to clearly assess the decisions that were made. My expectation is that we will hire out-side legal counsel to lead this internal review. I believe it is imperative that the City has all information that has led the City to the water quality issues that have arisen.

Internal Processes & Testing

We understand that EPA standards are the minimum requirements that utility systems are required to meet, the City will establish and move forward with higher standards and goals than those set by regulators. As these new standards are set, they will be published with a plan on how to obtain each goal complete with expected timeframes. The following are the first set of goals that have been set by the City that exceed the regulatory requirements.

Regulatory Requirements	City Goals
(1) F-1 Licenced Personnel	(2) F-1 Licenced Personnel
(1) S-1 Licensed Personnel	(2) S-1 Licensed Personnel
100 TTHM Samples per Month	120 TTHM Samples per Month
100 Lead/Copper Volunteer Samples / yr.	300 Lead/Copper Volunteer Samples / yr.
Annual Water Quality Report	Quarterly Water Report

Training

We will encourage all utility employees to become members of the American Water Works Association (AWWA) which is the largest nonprofit, scientific and educational association dedicated to managing and treating water. The AWWA offers continual training opportunities and the City will develop an internal training regimen that employees must adhere to. The goal is to continue to develop each employee which promotes a long term succession plan.

Technology

The addition of enhanced Supervisory Control and Data Acquisition (SCADA) will make sure that the system is running with the industries most updated technology and running as efficient as possible. The SCADA adds automation to the Water Plant thereby reducing the need for as much manual intervention. The City will also maintain Safe Drinking Water Technical Advisory Committee with more consistent meetings.

Enhanced Communication

We recognize that one of the key features of a Utility is the public communication with honest and candid information. We will increase the way we send information to people and the frequency that our communication is available. The following are first steps in that direction.

- Monitors around City Hall that display information about the water system

- Direct emails to individuals and neighborhood groups informing people where work is occurring
- Door hangers for field workers to distribute alerting people when water may be off or discolored
- A website page and GIS map dedicated to water events
- Quarterly Water reports that are directly mailed to users
- More frequent press releases that provide information relating to infrastructure concerns
- Immediate notification using all of the above media if a violation occurs
- An answering service so that every call is answered in a timely manor

Lead Service Lines

Every effort will be made to ensure a program will is in place to address the long-term goal of replacing all lead service lines. The program is expected to address the location of all City owned lead service lines and look to provide an opportunity for homeowners to receive a grant in order to have their service line changed at the same time as the city is changing its lines. This coordinated program will look to utilize funds from multiple avenues to support City residents, such as:

- CDBG Funds
- DWRF revolving loan funding
- Grant funding

Capital Improvement Plan

The City will continue to modify its 5-year CIP annually to make sure that we are always addressing the most critical issues facing the City. Another rate study will help set the correct rate for the system and determine the proper allocation to address concerns. The Water Reliability Study will continue to highlight the critical needs and will continue to be updated every two years.

As City Administrator, my goal is to ensure all of the necessary steps are in place prior to the implementation of KWA delivering water to the City. All of these initiatives will be inserted into the Utilities strategic plan and tracked regularly by staff, myself, and reported to the DPW Committee to ensure accountability.

PALINTEST
859 466 6093
314 471 9846
s/w BOB BARKER

Optimization and Maintenance of Optimal Corrosion Control Treatment

Preliminary Assessment

U.S. EPA Flint Task Force

11/24/2015
DRAFT

1.0 Overview

The United States Environmental Protection Agency (EPA) has offered, and the City of Flint has accepted, the assistance of EPA experts on corrosion and corrosion control. This preliminary assessment is intended to document the activities and funding necessary to enable EPA to provide advice and support to the City of Flint in optimizing and maintaining corrosion control treatment under current water quality conditions as well as during and after the upcoming transition to the Karegnondi Water Authority (KWA) pipeline.

[Note: There are many other communities scheduled to transition from their current water sources to the KWA pipeline. Although the source water will be the same for the City of Flint and all communities transitioning to the KWA pipeline source, the intended treatment planned for these communities may differ and the studies undertaken for the City of Flint may or may not be suitable for use by the other communities. It is strongly recommended that the EPA Task Force discuss with the Michigan Department of Environmental Management (MDEQ) the importance of actively working with these additional communities to ensure that proper studies on optimizing and maintaining OCCT are undertaken prior to putting the new KWA source in service for all affected communities. If such studies are not currently underway, they should be initiated as soon as possible.]

2.0 Information Request

In order to provide effective advice and assistance, the EPA Task Force should request the following information from the City of Flint.

2.1 Current inventory of homes with service line information in excel or similar format.

Pipe loops are corrosion control treatment assessment tools that enable evaluation of the effects of potential water quality changes and different levels of orthophosphate treatment on the existing pipe scales in order to select the most effective treatment before the treatment is applied on a city-wide basis. The pipe loops utilize lead service lines that are actively in service and carefully extracted so that the treatment assessment is conducted with pipes that represent conditions within the distribution system. As it would not be possible to perform service line extractions in the winter without significantly altering or dislodging the scales within the pipes, the identification and extraction of lead service lines should be given the highest priority to ensure that a sufficient number of lead pipes can be identified and extracted as soon as possible. In order to identify suitable homes with lead lines, the EPA Task Force will need current records on lead service line locations to be provided as soon as possible so that sampling can be coordinated and conducted to verify the presence of lead lines.

To minimize the need for excavation, homes with the longest lead service lines should be chosen so that multiple segments can be harvested from each lead line. The lead lines would typically be the longest where the water main is located across the street from the home and the home is set back on the property with respect to the street. An estimated 20 lead pipe segments should be carefully extracted and handled using ORD-specified procedures for use in constructing pipe loops at the treatment plant.

As the scales within the service lines have been subject to significant and iterative water quality changes in a relatively short period of time, it is also necessary to extract additional lead and non-lead portions of service lines to assess the current condition of the scales within the service lines.

2.2 All lead in water testing results for City of Flint, including those not used for Lead and Copper Rule compliance.

Studies have shown that homes served by lead service lines generally have much higher lead levels than homes without lead service lines. As it is anticipated that the City of Flint's service line records will be incomplete, the lead-in-water testing data is a supplemental tool that can be mapped to identify areas of the city that may have higher lead-in-water levels which would indicate the presence of lead service lines. This information will help the EPA Task Force in the identification and extraction of lead service lines for constructing the pipe loops and in identification of areas to test the progress of corrosion control.

2.3 Identification of areas in Flint with elevated blood lead levels.

Similar to the lead-in-water testing, identification of areas (e.g., zip codes, neighborhoods) where blood lead levels have increased since the switch to the Flint River can provide additional data which would indicate the presence of lead service lines for the identification of areas to test the progress of corrosion control.

2.4 Addresses of homes that have had water service interruptions or street disturbances (e.g., water main breaks, road/sidewalk construction, etc.) within the last year.

Streets where there have been potential physical disturbances and homes where the water service has been interrupted should be prioritized for evaluation for the presence of lead service lines as the disturbances can release very high lead and prolonged stagnation can affect the stability of the scales within the pipes.

2.5 Addresses of currently unoccupied homes.

Similar to homes where the water service has been interrupted, homes that are unoccupied should be prioritized for evaluation for the presence of lead service lines as these homes may pose a significant risk to incoming occupants if the home has a lead service line. Recently unoccupied homes also may provide important evaluation locations of water usage impacts on scale stability and lead release/exposure.

2.6 Identification of the pressure zones and location of each of the water quality parameter locations (addresses) within each pressure zone used for water quality parameter measurements (pH, alkalinity, orthophosphate, chlorine, total Coliform) in the distribution system, along with copies of the water quality parameter analytical results for past 4 rounds of monitoring.

In addition to corrosion control treatment optimization, the City of Flint must simultaneously comply with all other applicable National Primary Drinking Water Regulations (NPDWRs). A system-wide assessment of the water quality will provided information necessary to ensure that any potential issues with other NPDWRs can be identified and resolved. Information regarding the water quality in the distribution system is necessary to evaluate the stability of the water quality parameters throughout the distribution system, and to detect locations that may have the highest risk of lead release, TTHM formation, or the presence of microbial contamination.

3.0 Immediate Tasks and Timeline

The following tasks should be undertaken immediately (November/December 2015)

3.1 Determination on EPA funding commitment(s) (DRA).

3.2 Discussion with Central Regional Laboratory (CRL) regarding laboratory capabilities and support (GWDWB, ORD).

3.3 Development of EPA QAPPs encompassing the following activities (GWDWB, ORD, Others*):

- 3.3.1 Verification of presence of lead service lines*;
- 3.3.2 Pipe rig construction, operation, and maintenance;
- 3.3.3 Treatment assessment monitoring;
- 3.3.4 Evaluation of lead reservoirs within service lines; and
- 3.3.5 Evaluation of scale degradation due to stagnation events at unoccupied homes and water shut-offs*.

*If these activities are undertaken by one or more of the local partners, QAPP development should be part of the agreement.

3.4 Identification of local partners that can coordinate with the EPA Flint Task Force, MDEQ, and the City of Flint, and establishment of agreements to provide assistance on field and other activities (ORD).
[Potential local partners who have expressed strong interest and willingness to collaborate with EPA include Wayne State University, University of Michigan Flint, Michigan State University, Hurley Medical Center, and Genesee County Health Department.]

3.5 Outreach and education – specifics to be determined.
[Potential local partners Hurley and WSU have asked ORD directly if EPA can provide training/education for their staff on lead in water occurrence, sampling for lead, and corrosion/corrosion control treatment]

3.6 Assessment of information from 2.1 to verify the presence of a sufficient number of accessible homes with lead service lines that can be extracted for construction of pipe loops and to evaluate the current state and stability of the scales within the lead and non-lead portions of service lines (TBD).

3.7 Extraction of approximately twenty lead line segments with active water for construction of pipe loops, and six additional full service lines with different pipe material (two with lead and galvanized iron, two with lead and copper, and two with lead and plastic segments) for analyzing the lead reservoirs within the lead and non-lead segments of the service lines (TBD).

3.8 Risk evaluation and communication on the potential risk from physical disturbances to lead service lines, reoccupation of unoccupied homes and re-establishment of water service following water shut-offs (TBD).

4.0 Funding Needs (To Be Determined)

5.0 Proposed EPA Assistance

The narrative below describes the scope of work to be undertaken in providing assistance to the City of Flint and is contingent on adequate funding being provided.

5.1 Lead Service Line Detection Methodology Development

Verification of the presence of lead service lines is necessary for identification and extraction of lead service lines, sampling for treatment assessment, Lead and Copper Rule compliance sampling, risk evaluation and implementation of a lead service line replacement program. Blood lead level (BLL) or other lead-related health evaluations also need to be able to identify all lead sources for blood-tested individuals to prioritize risk locations and mitigation strategies. This methodology development is designed to determine if a simple water sampling protocol can give a convenient means to verify with some level of confidence, whether or not a residence has a lead service line, through relatively non-intrusive water sampling. Experience with other utilities has shown that paper records may either under or overestimate the presence of lead service lines.

The strategy to be employed is based on published protocols with improvements being researched by Polytechnique Montreal (Michele Prevost, Elise Deshommes, Clement Cartier). This requires staffing for coordination with Flint paper records, resident contact, plumbing mapping, field sampling (TBD, but estimated at 20 locations with no LSLs for "control" purposes, and 50 locations believed to have LSL for validation. Development of this protocol could involve re-sampling to test techniques, and could utilize one or more Palintest electrochemical analyzers after validation vs. ICP-MS. EPA-ORD has one Palintest analyzer which can be used. Field personnel would work closely with R5 CRL to test the limits of analytical performance of the Palintest analyzer.

5.2 Corrosion Control Treatment Optimization Evaluations

The corrosion control treatment optimization evaluations are necessarily separated into two stages. The first stage is intended to optimize corrosion control treatment with the current water source and water quality conditions. The second stage is designed to prepare for the transition to the new water source (KWA Pipeline) and water quality conditions, and to ensure that the City of Flint is able to simultaneously comply with all National Primary Drinking Water Regulations following the transition to the new source.

5.2.1 *Short-Term (Current) Lead Release Optimization Evaluation.* A lead pipe rig system will be constructed at the Flint water treatment plant with exhumed lead pipes, carefully collected and installed into the pipe rig. EPA-ORD will provide technical assistance in the rig design and construction, as well as the design provisions for chemical additions. One to two people will be required to be on-site to perform periodic chemical analyses and operate and maintain the pipe rig system, as well as to troubleshoot/repair any problems and to collect samples. Laboratory instruments for pH and colorimetric tests (chlorine residual, orthophosphate) will be needed on site. It is anticipated that the design will include a "control" loop and loops with possibly 3-4 different dosages, in duplicate. The

estimated sampling frequency would be at least three times per week, using ICP for metals and ICP-MS for lead on each sample, with one complete characterization sample before each stagnation period. Filtration apparatus will also be needed.

5.2.2 *Simultaneous Compliance Optimization Pilot Testing Prior to Flint Water Plant Treatment of KWA Water.* This effort will necessarily be more expansive than the short-term evaluation. The same control pipes would carry over, but new pipes would need to be stabilized with the current water. Upstream of the lead pipe rig, there would need to be a series of jar tests or a small pilot plant established to optimize coagulation, softening (if necessary), filtration and disinfection processes to meet disinfection byproduct (DBP) limits and microbial inactivation requirements. Investigations are also needed to assess the potential impacts of different possible treated Lake Huron water qualities on chlorine, biofilm growth, water age, microbial pathogens such as Legionella, phosphate demand and scaling potential. Pilot evaluations could be done on different unit processes using anticipated Lake Huron water, using university-run pilot plants, shipped or trucked water, etc. Some pilot evaluation analyses could be done on-site with portable analytical instrumentation as is typical. When a final water quality target is determined, the target finished water would become the source water to feed into the lead (and metal) pipe rigs, and thereafter the optimization of phosphate dosing would be done on the stabilized exhumed lead pipes in the pipe rigs. A reservoir may need to be constructed to hold processed simulated Lake Huron treated water produced by the pilot plant and fed to the pipe rigs. This evaluation must be started as soon as possible to allow sufficient time for reliable results to avoid having to conduct full-scale testing on water delivered into the distribution system that could impact Flint consumers after the switch to the KWA pipeline is made.

5.3 Lead Source/Release Diagnostic Evaluation

While the data collected from the pipe loops can provide information on the relative effectiveness of various treatment schemes, conditions at the plant are not the same as within the distribution system. Continued monitoring of lead levels at high risk sites throughout the distribution system is needed to make any necessary adjustments based on actual conditions within the distribution system. EPA estimates that approximately 45 homes will need to be identified for ongoing sampling to inform the treatment optimization process. (15 with lead & copper service line portions, 15 with lead & galvanized iron service lines and if available, 15 with lead and plastic service line portions). This evaluation is necessary for determining what the relative contributions of lead are from different plumbing sources in order to assure optimization of lead and other metal release from the service lines and premise plumbing. Two sampling rounds are the minimum expected for profile sampling which will utilize small volume samples through faucet and sink area and larger (one-liter) samples thereafter. Sampling would involve 15 sites for each combination of plumbing materials (total of 45 sites), with an anticipated 10-15 sequential samples per site for metals per sampling event. Additional samples will be collected and analyzed to characterize the water quality and the sequential samples will be analyzed for Pb, Cu, Fe, Zn, and Al. An experienced plumber or researcher will be needed to map the plumbing at each site, field personnel will be needed to collect and ship samples, and a data manager will be needed to manage the data. If dissolved vs. total metals are desired in the analyses, an addition person with field filtration skills will be needed, in addition to the lab

supplies. If meters, brass or galvanized pipe are found to be a significant source of lead, those devices should be included in the pipe rigs.

5.4 Impact of Water Use/House Occupancy on Stability and Lead Release from Lead and Other Premise Piping.

There are a large number of unoccupied homes in Flint. Homes which have been unoccupied for an extended period of time can pose a greater risk to incoming residents due to the stagnation of water within the plumbing over an extended period of time which can destabilize the scales within the plumbing and release high lead levels into the water. If access can be facilitated by the City of Flint or other organizations involved with housing, sampling will be conducted at 10-20 vacant or recently occupied homes in conjunction with a flushing program to assess how long it takes for increased water usage to improve the effectiveness of the corrosion control treatment for these homes. Sequential sampling profiles would be done for metals as well as chlorine residuals for each home. Flushing for different times would be tested and evaluated with repeated profile sampling to see if there is any improvement in lowering lead levels with increased water use.

5.5 Protocol for Exposure Estimation Sampling for Health-Related Evaluations (Premise & Building Plumbing).

This protocol development would compare various potential options for sampling to estimate the cumulative metal exposure from the drinking water in premise plumbing or schools. Comparisons would be made with manual or automated proportional sampling, tap POU units that could log water use and be disassembled and digested for metal content, and random daytime sampling protocols. Different types of POU-suitable filtration apparatus would be tested to see if designs would permit quantitative separation of dissolved versus particulate lead and other metals. Support would be needed for setting up and operating test systems, analyzing virgin and exposed filter/device materials with accumulated metals, building and installation of proportional samplers or development of protocol for resident-collected samples, rapid turn-around Lead and other water analyses of test exposure water fed into experimental systems.

5.6 Risk communication on lead service lines

Request OEJ support/assistance for the development and dissemination of risk communication material on lead service lines, including the potential risk from physical disturbances to lead service lines and lead reservoirs in other pipes downstream of lead service lines.

5.7 Pipe analyses for long-term treatment assessment and mechanisms of lead and other metals release

Optimization of corrosion control treatment requires specialized knowledge on scale chemistry as well as specialized equipment and equipment operating skills. The timeline for activities related to evaluating the progress in optimizing corrosion control treatment following the transition to the KWA pipeline source will extend beyond the current fiscal year and likely well into FY 2017. The necessary resources and expertise must continue to be made available to the Task Force for the expected duration of the project in order to ensure a successful outcome

which would enable the City of Flint to simultaneously comply with all NPDWRs following the transition to the KWA pipeline.

6.0 Timeline

The proposed activities are contingent upon available funding. As such, it is not possible at this time to develop a meaningful timeline, with the exception of the activities in Section 2.0 and some of the activities in Section 3.0 which are discussed in those sections. Once funding is secured a detailed timeline will be developed that incorporates both funded and unfunded activities. A Task Force member will be identified as the lead person responsible for ensuring the completion of each activity or group of activities to ensure that the work is completed in accordance with the timeline.

DRAFT

Flint Drinking Water Action Plan Update

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

- Comments on the corrosion control treatment plan received late in the day on October 30 from EPA were addressed, and the letter to the city of Flint regarding operational and monitoring conditions related to corrosion control was finalized. A PDF of the letter was e-mailed on October 30 to the city of Flint *et al.*

- Staff from DLARA and DEQ conducted plumbing assessments at both Brownell and Eisenhower Elementary Schools on October 30. Sampling taps were identified and labeled. Based on the plumbing assessment, a sampling sequence was recommended for each school.

Additional Actions:

- DEQ Flint Action Plan Coordinator George Krisztian and DEQ Public Information Officer Karen Tommasulo met with representatives of DLARA, DHHS, and city of Flint officials, including Mayor Dayne Walling, to discuss progress made since the last meeting and to discuss actions to come in the week of November 2. Topics included the issuance of a construction permit that would enable the city of Flint to provide supplemental phosphate addition to the water coming from Detroit. A high level summary regarding the progress of the testing for lead in drinking water in the Flint schools was provided with a subsequent discussion by the group as a whole. Mayor Walling inquired as to how remediation of the schools would be funded, and he was informed that funding was outside the purview of the initial assessment.

- Staff from DEQ and DLARA conducted water sampling at Brownell K-2 STEM Academy and Eisenhower Elementary School on Saturday, October 31. In addition, staff went back to Freeman Elementary School to pull sequential samples as per comments from EPA regarding DEQ's sampling protocol. The sequential samples were also taken at Brownell and Eisenhower. Complete sampling protocols have now been conducted at three Flint schools. There were a total of 374 samples taken at the three schools on October 31.

- As provided by DHHS, the purchased total water filter/pitcher distribution for the period of October 6 through October 29 is 9,880 units.

Prepared by: George Krisztian, Flint Action Plan Coordinator
Laboratory Director
Department of Environmental Quality
Telephone: 517-284-6719
Cell: PPI
November 2, 2015

FLINT SCHOOL TESTING RESULTS:

WHAT DID WE FIND?

1) The results of the initial screening conducted over the course of the last week are consistent with the last round of community lead and copper testing.

2) There were a total of 37 samples taken from 13 schools. Of those 37 samples, 4 exceeded the 15 ppb action level. There were 3 schools that had samples exceeding the action level: Eisenhower Elementary (which had two samples exceeding 15 ppb). Brownell STEM Academy and Freeman Elementary each had one sample exceeding 15 PPB. The sample from Freeman Academy was significantly higher than the other samples at 101 PPB.

3) Looking at the data from a health based perspective, the data clearly demonstrates that more detailed sampling needs to occur so that the various sources of lead contamination contained within each respective school's plumbing can be identified and addressed.

WHAT DOES THE DATA MEAN?

1) The data underscores the need for a complete and thorough evaluation of the plumbing system within each school.

2) We have developed a protocol for evaluating the plumbing systems and we will be working with schools to implement these protocols and to assist them in determining a corrective action plan to address this issue.

3) The State is identifying staff within DEQ, DHHS, LARA and Local County Health Departments to assist schools in conducting evaluations of their plumbing systems.

WHAT IS YOUR PROTOCOL?

1) DEQ's protocols are based on similar work done in Michigan and in other States.

2) Multiple samples from each tap used for cooking or drinking water will be collected at prescribed intervals to identify levels of lead and its likely source.

3) Once an evaluation is complete, we will be able to assist each School in developing a comprehensive plan to address issues on a site specific basis.

HOW DO SCHOOLS RESPOND?

1) Schools should continue protective measures that are currently in place until a complete study can be conducted at each school. This includes the continued use of bottled water for consumption purposes.

2) We will be reaching out to schools to schedule a complete evaluation, assessment and sampling, of their plumbing systems.

18

DEQ's 17 Point Partnering Plan

11/16/15
11/20/15

1. **After Action Plan (FAQ) will be ready by noon November 16, 2015**
   - First version complete – updated as needed

2. **School Test Data**
   - School reports to be expedited
   - Steve Busch creates summary reports
   - George Krisztian creates summary spreadsheet

3. **Blood exposure**
   - DHHS is lead on providing data

Comments given to DHHS on Protocol
ETC to conduct
EBLs to begin 11/19/15

4. **Meeting with Mayor Karen Weaver** Dec 3rd Gov's office
   - Harvey Hollins lead – Dan Wyant, Jim Sygo and George Krisztian to attend

5. **Messaging our Partnering Plan**
   - Provide ongoing public updates regarding Governor's 10 point plan
   - Continue emphasis on the availability of free testing for Flint residents
   - DEA has instructions to direct public to the website.

6. **Sampling Protocol**
   - Establish alignment with EPA Region 5 on sampling protocol

Lead Lead

7. **Lead service line replacement**
   - Expand RLF directed at lead service line replacement
   - Amy Epkey, Maggie Pallone and Sonya Butler

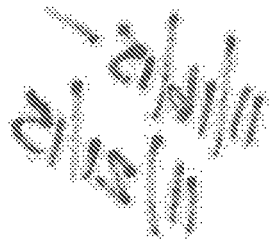
Meeting scheduled for 11/20/15

8. **Partner with EPA**
   - Jim Sygo → Bob Kaplan
   - Dan Wyant → Susan Hedman ~~Hedman~~
   - Mike Prysby and Steve Busch → Daren Lytle and Mike Schock
   - George Krisztian → Tom Burke
   - Region 5 staff Jennifer Crooks Tom Poy → ODWMA staff

9. **Meet with Mott Foundation to discuss Lead Service Line Identification Study**

After Mayors Meeting Include Daren & Mike from EPA

10. **Lead Education Program**
    - DHHS is the lead on Lead Education Program



11. Moving KWA forward

- Proactive meetings with KWA

* GEORGE & JOHN TO ASK FLINT TO SCHEDULE A MEETING WITH FLINT, DEQ & KWA.

REPLACEMENT OF MONITORS? HOW IS THIS BEING DONE? WHO IS OUR CONTACT(S)?

12. Participate actively with Technical Advisory Council

- GEORGE TO ASK WHO IS THE LEAD FOR THE JAC IS.

13. Utilize Joan Rose and MSU water expertise

14. Public Outreach

- Mayor Karen Weaver
- Genesee County Health Department
- Drs. Lawrence Reynolds, Eden Wells and Matthew Davis
- Ministers
- Land Bank
- Legislators
- Citizens

15. Outreach to schools

- EPA guidance on testing
- Work with state superintendent
- (ODWMA STAFF WORKING ON THIS)

16. Make recommendations to EPA about LCR

17. Compliance Communication letter sent November 9, 2015

- Wait until after Dec 30th

18. ENHANCE COORDINATION WITH HEALTH OFFICIALS REGARDING PERSONAL HEALTH NOTIFICATION OF DRINKING WATER ISSUES.

City of Flint Drinking Water
Outline prepared by the
Michigan Department of Environmental Quality for the
Flint Water Task Force

I. INTRODUCTION

This document is intended to provide an overview of Michigan's implementation of the Safe Drinking Water Act, 1976 PA 399, as amended (Act 399), with respect to events in the city of Flint (City), Michigan.

II. BACKGROUND

1. How has Flint historically obtained its drinking water?

The water system in the City was organized and built under private ownership in 1883 as the Flint Water Works Company to pump raw water from the Flint River to their consumers. In 1903, the system was converted to a municipally-owned corporation which supplied drinking water to the City. In 1967, the City became a customer of the Detroit Water and Sewerage Department (DWSD) system.

After the switch to DWSD, the City operated its water treatment plant as a standby plant for purposes of reliability in the event of an emergency, such as an interruption in service of the single pipeline from DWSD. In the last ten years, the water treatment plant was used as an emergency backup during two weeks in 2009: June 18 through June 20 and September 10 through September 13.

As a backup emergency water treatment plant, the City was required to operate the water treatment plant quarterly to demonstrate the capability to produce drinking water in accordance with Act 399 and to keep mechanical equipment (such as valves, rubber seals, etc.) in good working order. Each quarter, the water treatment plant was test run and samples were taken of both raw water and finished water (post-filters). Since the water treatment plant was upgraded in the early 2000s, monitoring showed that the water treatment plant was performing as designed.

Contractual obligations with DWSD did not allow treated water to be put into the City's distribution system during these test runs. Treated water was discharged to the Flint River in accordance with a National Pollutant Discharge Elimination System (NPDES) Permit. The test runs were for demonstration purposes, to keep the water treatment plant operational, and staff familiar with operation in the event it was needed in an emergency.

2. What State and Federal laws or rules exist to ensure safe drinking water is provided to City residents?

The federal Safe Drinking Water Act (federal SDWA) is the primary law that ensures the quality of Americans' drinking water. Under the federal SDWA, the United States Environmental Protection Agency (USEPA) sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.

The federal SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. (The federal SDWA does not regulate private wells which serve fewer than 25 individuals.)

Originally, the federal SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

The most direct oversight of water systems is conducted by state drinking water programs. States can apply to the USEPA for "primacy," - the authority to implement the federal SDWA within their jurisdictions - if they will adopt standards at least as stringent as the USEPA's and enforce those standards. Michigan adopted the Safe Drinking Water Act in 1976 through Act 399 and has maintained primacy for the program since that time.

3. What is the USEPA's role as a regulatory agency in implementing the SDWA?

Federal and state governments share responsibility for administering drinking water programs. Under the federal SDWA, the USEPA is given the responsibility for developing national standards and regulations that apply to the nation's public drinking water systems and enforcing those standards, by working with states.

Michigan's drinking water program is evaluated annually by the USEPA for compliance with the federal SDWA. Based upon these evaluations, the USEPA continues to find Michigan's drinking water program to be compliant with the federal SDWA.

4. What is the Michigan Department of Environmental Quality's (DEQ) role as a regulatory agency in implementing the SDWA?

The federal SDWA permits states to accept oversight of the drinking water program under an agreement with the USEPA giving states primary enforcement responsibilities (or primacy). In addition to this delegation of federal authority to the states, states also have the power to create additional regulations and programs governing drinking water suppliers through their own legislative and regulatory processes. Michigan has had regulatory authority of public water supplies since 1913 (Waterworks and Sewerage Systems, 1913 PA 98).

The DEQ has been granted primary enforcement authority in Michigan for the federal SDWA under the authority of Act 399. As such, the DEQ, Office of Drinking Water and Municipal Assistance, has regulatory oversight for all public water supplies, including approximately 1,400 community water supplies and 10,000 noncommunity water supplies. A community water supply provides year-round service to 15 or more living units (homes, apartments, dorm rooms, etc.) or 25 or more residents. A noncommunity water supply has 15 or more service connections or serves 25 or more individuals on an average daily basis for not less than 60 days per year.

The DEQ engages in a variety of activities to help water systems remain in, or return to, compliance. These activities include: conducting surveillance visits (inspections) at water systems and reviewing facilities, equipment, and operations; requiring the submission of plans and specifications for waterworks system improvements and issuing construction permits; providing for the training, examination, certification and regulation of persons operating water supplies; helping systems incorporate preventive measures; and since 1996, providing financial assistance for system improvements.

5. What is the City's role in implementing the federal SDWA and Act 399?

State and federal programs develop regulations and perform oversight and compliance activities, but do not treat or deliver water to customers. At the local level, public and private water utilities collect, treat, and deliver drinking water to consumers in compliance with state and federal regulations.

The federal SDWA and Act 399 set up multiple barriers against contamination. These barriers include: source water protection, multiple treatment components, distribution system integrity, proper operations oversight, and public information. As the owner of a public water system, the City is responsible for knowing and following all requirements under Act 399, such as ensuring proper design, construction, operations and maintenance, so that contaminants in tap water do not exceed the standards established by law. The City treats the water, and must test its water routinely for specified contaminants and report the results to the DEQ. If a water system is not meeting these standards, it is the water supplier's responsibility to notify its customers.

The federal SDWA and Act 399 recognize that customers have the right to know what is in their drinking water and where it comes from. The City, like all water suppliers, must notify consumers when there is a problem with water quality.

The City submits samples of its water for laboratory testing (monitoring) to verify the water it provides to residents meets all federal and state standards. How often and where samples are taken varies from system to system and from contaminant to contaminant. The DEQ provides an annual monitoring schedule to the City setting forth these requirements.

In addition, the City is required to employ properly certified water operators that are trained and experienced to operate the treatment and distribution systems associated with the City's water system.

6. What approvals were needed from the DEQ in order for the City to begin using its water treatment plant full time?

The City had long ago been issued construction permits for raw water pumps to withdraw water from the Flint River and the City was grandfathered under the water withdrawal program (Part 327, Great Lakes Preservation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended), as were all existing community public water systems at that time. There were no additional DEQ

permissions or authorizations required under Act 399 because the City already had approval to use the water treatment plant.

Under Act 399, there are no licenses or permits required to operate public water systems. The City did apply for and obtained two construction permits prior to the water treatment plant changing from an emergency backup plant to full-time operation. These permits were for new chemical feed equipment, changes to the electrical service, etc.

III. THE FLINT RIVER – IS IT A SAFE SOURCE OF DRINKING WATER?

Seventy-five percent of Michigan's population served by a public water supply receive their drinking water from surface water sources, the majority of which is withdrawn from the Great Lakes. However, several public water supplies in Michigan utilize water from inland rivers. All surface water sources require significant treatment in order to be safe for consumption.

While all surface water sources must receive a high level of treatment, inland river sources present a greater challenge than water withdrawn from one of the Great Lakes because of rapidly changing water quality conditions. Under most circumstances, rivers are prone to greater fluctuations in temperature, have higher amounts of organic material, greater turbidity (suspended solids), and are more vulnerable to microbiological and viral contamination than Lakes Huron, Erie, Michigan or Superior. While the water chemistry in the Flint River differs from that in Lake Huron, it can still be treated in accordance with the federal SDWA and Act 399. The waterworks industry has the technology to treat wide ranging source waters to provide potable and palatable drinking water, including direct reuse of treated wastewater. Regardless of source water quality, all public water systems must comply with the same drinking water standards in the finished water.

It is not the source water that reacts with the homeowners plumbing in the distribution system, but rather the finished water quality that is important. Treated water leaving the City's water treatment plant does not contain lead. In addition, the treatment process employed by the City includes lime softening to reduce the hardness in the river water. The City includes lime softening and pH adjustment primarily to improve aesthetic water quality associated with hardness. Lime softening is not a process that water supply professionals would expect to increase corrosivity of water. The City, however, does practice recarbonation to readjust pH at the end of the softening process.

pH levels of finished water leaving the City's water treatment plant averaged 7.7. Expanded water monitoring conducted quarterly at 25 sample sites located throughout the distribution system showed the following:

July – September 2014	average pH = 7.71	range: 7.56 – 7.86
October – December 2014	average pH = 7.88	range: 7.62 – 8.10
January – March 2015	average pH = 7.81	range: 7.60 – 7.99
April – June 2015	average pH = 7.63	range: 7.48 – 7.80

The data below was obtained at ten of the sampling locations throughout the City's distribution system, while they were still purchasing water from DWSD before the City switched to the Flint River as a source:

January – March 2014 (DWSD)	average pH = 7.47	range: 7.40 – 7.54
April 2014 (DWSD)	average pH = 7.49	range: 7.42 – 7.59

Note that the pH of the treated water produced while the City was using the Flint River did not differ significantly from pH values seen in the distribution system during the time the City purchased water from DWSD. Thus, pH monitoring provided no indication of a change in water corrosivity.

IV. *E. COLI* AND TOTAL COLIFORM BACTERIA VIOLATIONS

1. What caused the *E. coli* and total coliform bacteria violations experienced by the City in August and September 2014?

A number of factors, primarily related to distribution system operation and maintenance, likely contributed to the Boil Water Advisories in the City during August and September 2014 triggered by exceedances of bacteria standards in limited areas of the distribution system. In addition, the coliform detections were confined to less than 20 percent of the water system. Had the detections been the result of a failure in treatment, detections would have been expected throughout the City rather than in such a limited geographic area.

Instead, the violations seem to have been caused by other factors such as aging infrastructure. The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of unlined cast iron piping. This cast iron pipe is subject to tuberculation, which thins and weakens the pipe walls in some areas and causes a buildup of sediment and debris on the pipe walls in other areas. Tuberculation can lead to water quality issues as well as reduced flows and pressures. Tuberculation also encourages the development of biofilms. Biofilm growth may occur more frequently in areas where little or no disinfectant is maintained.

The City has also experienced decades of a declining customer base and water use, with vacant homes, commercial businesses, and industrial property. Declining water use leads to excess residence time (water age) within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and reductions of disinfectant concentration in the distribution system. While the City has recently seen an infusion of funding for blight removal, contractors using fire hydrants to complete this work have been known to cause hydraulic disturbances that dislodge and suspend settled debris, which may contribute to the bacterial contamination. These hydraulic disturbances were also believed to be a source of the aesthetic water quality complaints both the City and the DEQ were receiving.

The winter of 2013-2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30 percent, saw even greater losses since February 2014 due to an increase in cold weather-related water main breaks and leaks (City personnel reported 400 water

main breaks in calendar year 2014, with greater than 50 percent in the winter quarter). The City has also been lacking a formal maintenance program for its more than 7,250 valves, which are critical in limiting the areas impacted during water main repairs. As an example, two valves on the transmission line used to supply the area of the 2014 Boil Water Advisories were found to be closed during the City's investigation of possible sources, causing much longer residence times, reduced disinfectant concentrations, and reduced pressures – all potential avenues for contamination to enter a distribution system.

The Boil Water Advisories also occurred during the warmest and relatively wet periods of August and September 2014. Warm weather conditions are not only more conducive to bacterial growth but also degrade disinfectant concentrations more quickly. As already explained, longer residence times, biofilms, and tuberculation contribute to lowered disinfectant concentrations. Warm, wet weather conditions also allow water contaminated with bacteria to accumulate or pond around piping that leaks and breaks.

During the summer of 2014, the City was actively repairing the distribution system (City personnel reported 29 water main breaks in June through August 2014). After the switch to the Flint River, it was discovered that there were many broken or closed valves in the distribution system (City personnel reported 120 broken valves and 239 valves in an improper position). As the City began correcting these problems, they did detect the presence of coliform organisms in the distribution system in testing conducted as a result of the repairs. This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

2. How were the violations detected? What was the DEQ's response?

Federal SDWA regulations regarding monitoring and standards for bacteria in water distribution systems are incorporated into Act 399. There are a variety of bacteria, parasites, and viruses which can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, community water systems are required to test monthly for total coliform and *E. coli*. Total coliform bacteria, while not pathogenic, often originate from the same sources as many pathogens. Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system indicates a minimal likelihood that pathogens are present. *E. coli* is itself a pathogen and its detection is considered direct evidence of a health risk.

The Boil Water Advisories which occurred in the City were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the City after consultation with the DEQ.

Upon receiving information indicating total coliform and *E. coli* bacteria had been detected, the DEQ advised the City to issue a Boil Water Advisory from August 15 through 20, 2014, for the affected portion of the City. Another Boil Water Advisory was issued from September 5 through 9, 2014, due to localized detections of total

coliform bacteria in the same and adjacent portions of the City. The advisories covered an area of less than 20 percent of the water department's service area.

Once a Boil Water Advisory has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Under approved analytical methods used by the City, samples must be incubated for 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a Boil Water Advisory. Adding each of these steps together, a normal response period to rescind a Boil Water Advisory under these circumstances would be expected to take 3 to 4 days.

V. TOTAL TRIHALOMETHANES (TTHM) VIOLATIONS

1. What caused the TTHM violations experienced by the City beginning in late summer 2014?

Disinfectants are an essential element of drinking water treatment because of the barrier they provide against waterborne disease-causing microorganisms. However, disinfection byproducts form when disinfectants used to treat drinking water react with naturally occurring organic materials in the water (e.g., decomposing plant material). The formation of disinfection byproducts continues to occur as water travels throughout water distribution systems.

A major challenge for water suppliers is how to provide protection from pathogens while simultaneously minimizing health risks to the population from disinfection byproducts. Total Trihalomethanes (TTHM – chloroform, bromoform, bromodichloromethane, and dibromochloromethane) and halogenated acetic acids (HAA5 – monochloro-, dichloro-, trichloro-, monobromo-, dibromo-) are widely occurring classes of disinfection byproducts. The amount of TTHM and HAA5 in drinking water can change depending on the season, water temperature, amount of chlorine added, the amount of plant material in the water, and a variety of other factors. All community water systems that chemically disinfect or purchase water that has been chemically disinfected are required to monitor for disinfection byproducts.

The Flint River has higher levels of organic material than water in the Great Lakes and as a result, the water produced by the City developed higher disinfection byproducts than the water purchased from DWSD. Because the water treatment plant was previously operating intermittently, it was not possible to predict disinfection byproduct levels at distribution system compliance points until the City began relying on its water treatment plant continuously.

As mentioned previously, the City became aware that there were numerous broken valves and closed valves that should have been open in the distribution system. At that time, the City also began a mapping effort to identify "water age" in the distribution system. The longer the residence time or "water age" the greater the opportunity for the formation of disinfection byproducts.

2. How were the violations detected? What was the DEQ's response?

Disinfection byproducts are monitored at eight sites throughout the distribution system. A locational running annual average is calculated for each individual site. Because TTHM and HAA5 maximum contaminant levels are calculated based on a running annual average at specific distribution system locations, the actual violation of the standard did not occur until the fall of 2014. However, because it was apparent in the summer of 2014 that the standard would eventually be exceeded; the DEQ asked the City to proactively implement measures to address the problem before the violation required them to do so.

As a result of maintenance efforts undertaken by the City to repair valves and correct improperly closed valves, the City was able to improve water flow in the distribution system and thereby reduce residence time or "water age" in the system. Operational changes made to reduce the amount of storage in the system also helped reduce residence time which contributed to a reduction in disinfection byproduct formation.

In addition to operational changes to minimize residence time in the distribution system, the City added granular activated carbon to its filters in July 2015. Levels of TTHMs and HAA5s were reduced and the City returned to compliance on September 1, 2015.

VI. THE TASTE, ODOR, AND COLOR COMPLAINTS RECEIVED BY FLINT

1. What caused the taste, odor, and color complaints received by the City from residents?

Taste, odor, and color issues are very personalized. While water leaving the water treatment plant did not have any unusual taste, odor or color; during the summer after the switch to the Flint River, customer complaints increased. Construction in the distribution system, hydrant flushing, and changes in flow characteristics are all known causes of disturbances within the distribution system that can cause an increase in taste, odor, and color complaints. Aesthetics, such as taste, odor, and color, while a concern, by themselves are not a threat to public health.

2. What was the DEQ's response?

The DEQ consulted with the City regarding these complaints. The City indicated that they were offering to investigate such complaints for anyone that had issues; but City personnel informed the DEQ that they were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHMs, it was anticipated that there would be short-term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) often causes temporary problems as described. Based on information from City personnel, it appeared that the complaints were related to such operational activities occurring in the distribution system.

VII. LEAD ISSUES IN THE FLINT DRINKING WATER

1. What causes lead in drinking water?

Lead is rarely found in source water. Lead enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead fixtures and solder. Older homes built prior to World War II are more likely to contain lead pipes. The most common problem with newer construction is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially hot water. The amount of lead in tap water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the pH of the water, and its temperature.

2. What is the Lead and Copper Rule?

On June 7, 1991, the USEPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR). The treatment technique for the rule requires systems to monitor drinking water at customer taps. If the 90th percentile for lead exceeds an action level of 15 parts per billion (ppb) or the 90th percentile for copper exceeds an action level of 1.3 parts per million (ppm), the system must undertake a number of additional actions to control corrosion. If the action level for lead is exceeded, the water supply must also inform the public about steps they should take to protect their health and the water supply may have to replace lead service lines under their control.

3. What is the lead action level?

For most contaminants, the USEPA sets an enforceable regulation called a maximum contaminant level based on the maximum contaminant level goal. Maximum contaminant levels are set as close to the maximum contaminant level goals as possible, considering cost, benefits, and the ability of public water systems to detect and remove contaminants at the water treatment plant using suitable treatment technologies. Because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, the USEPA established a treatment technique rather than a maximum contaminant level for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to control a contaminant. Although the maximum contaminant level goal for lead is zero, based upon the above factors, the USEPA has established the action level for lead at 15 ppb.

The treatment technique regulation for lead requires water systems that produce drinking water to control the corrosivity of the water. The regulation also requires systems to collect customer tap samples from sites served by the system that are more likely to have plumbing materials containing lead. If the 90th percentile action level for lead is exceeded, then water systems are required to take additional actions including:

- Optimizing corrosion control treatment (for water systems serving greater than 50,000 people that have not fully optimized corrosion control).

- Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.
- Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

4. Did DWSD have optimized corrosion control treatment?

After the LCR passed in 1991, DWSD and all of its consecutive customer systems conducted two rounds of monitoring for lead and copper. Copper levels were well below action level limits, but lead levels exceeded the action level of 15 ppb for DWSD and many of its customer communities. As a result, DWSD installed corrosion control treatment. DWSD performed a corrosion control study and concluded that they could reduce the corrosivity of the water by the addition of an orthophosphate, a corrosion inhibitor.

5. Did the DEQ require the City to have corrosion control in place when it switched to the Flint River as its source of drinking water?

No. There are two ways under the LCR to deem a water supply as providing "optimal corrosion control" – either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment if it is needed. The DEQ requested that the City perform two 6-month rounds of monitoring to demonstrate if the City was practicing optimal corrosion control treatment. According to state regulations [R325.10604f(2)(b)(iii)], a system can demonstrate optimized corrosion controls by sampling in two, consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the source water has 0 ppb lead, the City would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods. However, once a system has installed treatment, it would also be considered optimized regardless of the 90th percentile level achieved, as long as it does not exceed the action level of 15 ppb.

In this case, the City had been purchasing water from DWSD that was treated for corrosion control. It was the DWSD water system that was considered as having optimized corrosion control at that point. Since the City water system had not been the supplier of water before, the DEQ did not require the City to maintain corrosion control for which it was not responsible [R325.10604f(2)(b)]. It could not "maintain" operations undertaken elsewhere by a different entity for a different source of water. The DEQ's instructions to the City were consistent with past practices afforded to all other large water systems. At the beginning of the LCR, all large systems were initially granted the option to demonstrate optimal corrosion control treatment through full-scale monitoring under the applicable rules. For these reasons, two 6-month rounds of monitoring, as required by the LCR, were the required means to determine whether or not optimal corrosion control was being achieved.

6. How does the DEQ calculate the 90th percentile?

To determine the 90th percentile of a list of lead or copper results, the procedure below is followed:

Step 1: Place lead or copper results in ascending order
Step 2: Assign each sample a number, 1 for lowest value
Step 3: Multiply the total number of samples by 0.9 – this yields the 90th percentile sample. For example: 20 samples x 0.9 = 18th sample. This is the 90th percentile level.

Calculating the 90th percentile is easiest when a supply collects 10 samples (or a multiple of 10). Note that the 90th percentile must be interpolated if the number of samples is not a multiple of 10.

7. What was the result of the first round of monitoring conducted by the City?

The first 6-month round of lead and copper monitoring conducted by the City ended on December 31, 2014. One hundred samples were submitted and the 90th percentile lead level was calculated to be 6 ppb. The next step required by the DEQ was for the City to collect a second round of monitoring.

8. What was the result of the second round of monitoring conducted by the City?

The second 6-month round of lead and copper monitoring conducted by the City ended on June 30, 2015. Sixty-nine samples that complied with the site selection criteria were submitted and the 90th percentile lead level was calculated to be 11 ppb. The conclusion from these results was that the City, while in compliance with the action level, exceeded the level required to be deemed as having optimized corrosion control.

9. Why was the City required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of Act 399.

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples the City was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census, which listed the City's population as more than 100,000 residents. In March of 2015, the City provided updated information that indicated the City's population had decreased to less than 100,000. Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

10. What actions did the DEQ order the City to undertake after the second round of monitoring?

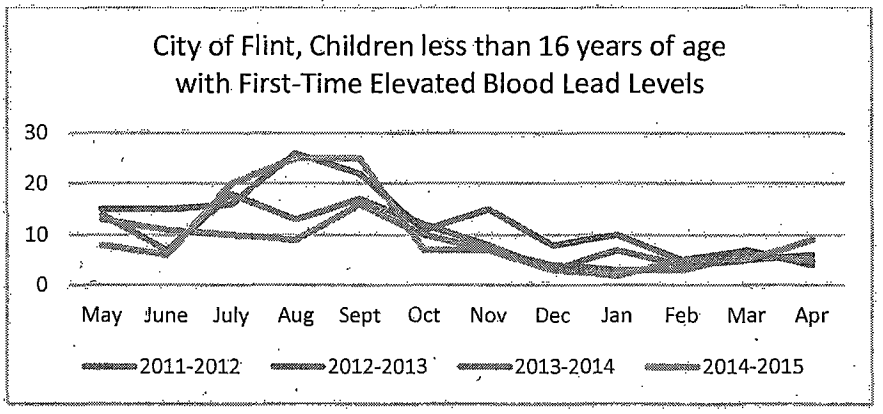
While the City's LCR compliance monitoring continued to meet action level requirements, the City exceeded the level required to be deemed as having optimized corrosion control. Following receipt of the City's compliance monitoring results, the DEQ sent a letter on August 17, 2015, requiring the City to install corrosion control treatment.

Under the LCR, the City has 6 months to let the DEQ know whether it intends to conduct a study, then 18 months to perform the study and make its recommendation, and 24 months to complete installation of the selected corrosion control. The DEQ requested the City accelerate this schedule. The City submitted plans and specifications to install corrosion control treatment and a construction permit was issued by the DEQ on October 28, 2015. The City is in the process of installing the necessary equipment and procuring the appropriate chemicals. Treatment is expected to be on-line by the end of November 2015. As of October 16, 2015, the City resumed purchasing water from DWSD that is already optimized and provides a corrosion inhibitor. The additional treatment by the City will further enhance the amount of inhibitor in the system.

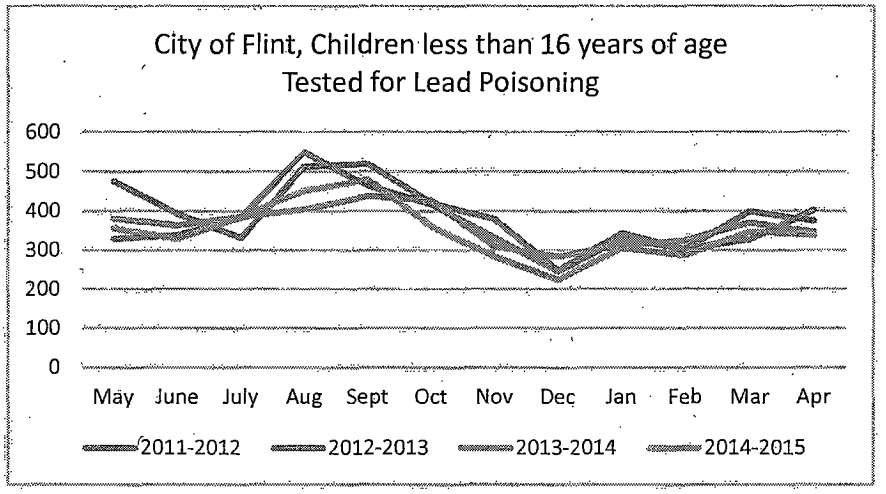
11. What had Michigan Department of Health and Human Services (DHHS) advised the DEQ regarding blood lead levels prior to the DEQ ordering the City to implement optimized corrosion control?

In an e-mail dated July 28, 2015, regarding blood lead testing, the Michigan DHHS indicated that they:

> "...compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –
>
> • Lead testing rates remained about the same from year-to-year...



- There was a spike in elevated blood lead tests from July-September 2014...



- However, that pattern was not terribly different from what we saw in the previous three years; especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).

- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspected that the summer data spike may be related to this effect.

- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015."

This e-mail from DHHS in concert with the completion of two 6-month rounds of lead compliance sampling data indicating that the City had not exceeded an action level for lead provided the basis for the DEQ to maintain that the water in the City continued to be in compliance with the federal SDWA and Act 399.

12. When did the DEQ first become aware of allegations of elevated blood levels being detected in certain children?

The DEQ was notified on August 23, 2015, by a professor from Virginia Tech that "over the next few months we will be studying Flint water quality issues..." Results indicating elevated lead levels in homes were reported as part of this study in late August. In September 2015, information was reported in news articles that

pediatricians in the City had data suggesting an increase in children's blood lead levels in two zip codes in the Flint area.

Prior to these dates, the City had already completed the required two 6-month rounds of monitoring and the DEQ had made a determination that the City must install corrosion control treatment as documented in correspondence dated August 17, 2015.

VIII. QUESTIONS RAISED REGARDING THE DEQ'S ACTIONS

1. **What was the DEQ's response to the USEPA's inquiry in February 2015 regarding the optimized corrosion control treatment being implemented by the City under the LCR?**

   The DEQ indicated that the City was complying with the LCR, the lead 90th percentile level was below the action level of 15 ppb, and the City was already conducting the second round of monitoring which would provide for a determination of whether additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the LCR that lead results be lower than they were before treatment was installed. The 90th percentile only needs to be lower than the action level in the LCR.

2. **Did the DEQ attempt to mislead the USEPA in a February 27, 2015, e-mail responding to the USEPA's inquiry regarding Optimal Corrosion Control Treatment?**

   No. There was no attempt by the DEQ to mislead the USEPA. There is an e-mail from Steve Busch, Jackson and Lansing District Supervisor, Office of Drinking Water and Municipal Assistance, indicating that the City was practicing a corrosion control program. What was meant was that the City was performing the required monitoring to determine whether or not they were practicing optimized corrosion control. The DEQ subsequently clarified its position in follow-up e-mails and telephone conversations with the USEPA.

3. **When General Motors announced its intent to terminate water service from the City and purchase water from Genesee County, should this have been a sign that there were concerns with the quality of the water after the switch to the Flint River?**

   No. General Motors made a decision regarding the quality of water for its manufacturing processes. At the time, the company indicated that the chloride levels were above limits acceptable as part of the manufacturing facility's limit for production purposes. The level of chlorides in the water treated by the City was not a human health or aesthetic concern.

   Chloride does have a secondary maximum contaminant level established by the USEPA, not for health-related concerns but rather for taste and aesthetic concerns. Concentrations greater than the secondary maximum contaminant level of 250 milligrams per liter (mg/l) become objectionable due to taste. According to the City's records, the chloride concentration in the Flint River water is generally about 45 mg/l and the treated water chloride concentration leaving the water treatment

plant ranges between 55 and 65 mg/l. It should be noted that the City uses ferric chloride as its primary coagulant, although this does not add a significant amount of chloride to the finished water.

4. **Has the USEPA subsequently admitted that the LCR is subject to differing interpretations such as that presented by the DEQ?**

   Yes. On November 3, 2015, the USEPA issued a memorandum regarding the "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems". This memorandum addresses concerns raised about the application of the LCR, specifically the requirements pertaining to maintenance of optimal corrosion control treatment, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. The USEPA states that this type of situation rarely arises, that the language of the LCR does not specifically discuss such circumstances, and that there are differing possible interpretations of the LCR with respect to how the rule's optimal corrosion control treatment procedures apply to this situation. The memorandum is intended to clarify, on a prospective basis, steps agencies should take or apply in the future. USEPA's new guidance provides acknowledgement that the LCR is subject to differing interpretations. The DEQ's interpretation and application of the LCR in this situation was in compliance with the federal SDWA and Act 399.

5. **Did the DEQ reject any of the samples submitted by the City?**

   Yes, samples at two locations were excluded from the compliance calculation in conformance with rules issued by the USEPA.

   According to the LCR, compliance samples must be a first draw, 1-liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted high-risk sampling sites, called Tier 1 sampling sites. For a municipality such as the City, the Tier 1 sampling pool must consist of single family structures that are:

   - served by a lead service line,
   - contain lead pipes, or
   - contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

   As long as a community has Tier 1 sites that contain lead service lines, they are required to collect at least 50 percent of their compliance samples from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters, etc. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point-of-use or point-of-entry treatment can only be used if the community has insufficient Tier 1 sites available.

One of the samples submitted by the City was excluded from the 90th percentile compliance calculation in the latest monitoring period because it was taken from a tap at a non-residential site (non-Tier 1). The other sample result that was excluded was collected from a single family home that has a whole house treatment system. Both of these sites are, therefore, excluded from the compliance consideration based upon federal and state rules.

6. Did the DEQ review the information submitted by the City to ensure all samples were from Tier 1 sites?

Yes. The DEQ examined the information submitted and certified by the City that its LCR compliance monitoring sites consisted entirely of Tier 1 criteria sites, which met the requirements of this rule to maximize sampling of high-risk targeted sites.

During the initial implementation of the LCR approximately 25 years ago, water supplies were required to complete a materials evaluation of their distribution system to identify a pool of targeted, high-risk sampling sites. These sites were to be categorized into one of three Tiers (1, 2, or 3) based on risk. The DEQ created an LCR reporting template for water systems to identify each compliance sampling site by Tier, service line material, and building plumbing material.

If a water system has sufficient Tier 1 sites, they are required to sample them before using any lower Tier sites. Furthermore, if they have sufficient sampling sites with lead service lines, they are required to use them to make up at least 50 percent of their sampling pool each monitoring period. Water supplies are also required to use the same sampling sites each time or explain on their LCR reporting form why they were unable to do so. Finally, the water system is required to certify all of the information they provide on the LCR reporting form is factual.

The DEQ must rely upon the public water system to identify appropriate sampling sites for LCR monitoring. The DEQ public water supply program has no control or authority over service lines or domestic plumbing. As a result, we have no records on construction standards or materials used by customers for these components. If these records exist, they are kept by plumbing code enforcement officials.

In 2015, City employees again certified that the information submitted on their LCR monitoring reports for the two 6-month rounds of monitoring conducted after they began treating the Flint River were accurate, and DEQ staff review of that information indicated it was in compliance with the monitoring requirements. The DEQ had no reason to question the validity of the City's reports until the DEQ heard City employees revealing to the media that the City did not know for certain if its compliance monitoring was collected from homes with lead service lines. As a result, the DEQ began to investigate the City's monitoring sites. As the City began to transfer its customer information to electronic records, the DEQ determined from the information available that a significant number of these sites that had been listed as having lead service lines either did not have them or the information was unavailable. On November 9, 2015, the DEQ notified the City in writing that it would be necessary to conduct a complete assessment of its sampling pool and report back its findings by December 30, 2015. The DEQ is now awaiting the City's response.

7. Did the DEQ believe the levels of lead found at 212 Browning in April 2015 were indicative of a system-wide problem?

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The City replaced the lead service line May 6, 2015. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem, and subsequent sampling taken at this address showed that replacement of the service line did mitigate the problem. There was, therefore, no reason to believe that this was indicative of a system-wide problem.

8. Do the DEQ's sampling instructions comply with the LCR?

The DEQ continues to seek official clarification from the USEPA regarding the sampling protocols. The DEQ's sampling recommendations were developed to ensure compliance with the USEPA's guidance provided in the preamble to their lead and copper regulations that said that household use should be "typical" for a residential customer on the day before sample collection for lead and copper. Early in the implementation of the LCR, the DEQ had encountered too many situations where compliance samples had been collected from kitchen and bathroom taps that had not been used in days and in some cases, even weeks, resulting in excessively stagnated water and correspondingly high lead levels that did not represent typical exposure expected after overnight stagnation. To incorporate these results into further regulatory decision making could have led to actions that were not indicative of a true public health threat. Further complicating this issue was the USEPA's direct implementation of the LCR in Washington, D.C., where it was learned that some "valid" lead results were not always being included in compliance calculations. Subsequently, the USEPA made invalidation of samples for any reason much more difficult. In order to ensure samples were taken at customer taps representative of typical use, the DEQ devised the current recommendations for ensuring appropriate but not excessive stagnation for LCR monitoring.

The DEQ continues to believe it is appropriate to ensure that taps being sampled are representative of typical household use and are sampled during the recommended stagnation period of 6-18 hours. The LCR does not say the result should represent the "absolute worst case" condition – it talks about sampling the highest risk locations (lead plumbing, lead service lines, high lead content solder piping, etc.) after overnight stagnation and then collecting a first draw sample so as not to flush elevated lead from that tap at that point in time. There are a number of other states that share the DEQ's interpretation of the rule and the DEQ encourages the USEPA to provide official clarification directed at all states with primacy.

9. Does the DEQ require the use of small-neck bottles to obtain samples?

No. The DEQ does not mandate the use of small-neck bottles; it is the sampling method that is specified in both the federal SDWA and Act 399. Each certified drinking water laboratory provides bottles to their customers upon request for any particular analysis in accordance with the specifications in the SDWA. The bottles provided by the DEQ Drinking Water Laboratory for a lead and copper corrosion control sample meet these requirements.

→ Things that were not fully understood

Governor Snyder Talking Points

Press Conference on Flint Drinking Water
Kettering University, Flint
October 2, 2015

Public Safety Paramount Concern

Dr. Marc Edwards Appreciate Citizens & Research

- **Appreciate that he has brought attention to the issue.**
- **He deserves credit for bringing attention to the issue.**
- **At issue is lead exposure: This must be addressed.**
- **Actions outlined today address public safety and confidence in the water.**

Was it a mistake?

- **We draw water from the surface.** Drinking Water
- **Treat it to safe drinking water standards.** Plant Removes Lead.
- **At issue is lead exposure.**
- **Issue must be addressed.** We All Need to Do More –
- **Actions are being taken.**

Did you put kids at risk?

- **Lead exposure is a serious issue, and steps need to be taken to eliminate exposure.**
- **We stay committed to working in partnership with the United States Environmental Protection Agency and locals.** City of Flint - Reduce Exposure
- **Susan Hedman, Regional Administrator, Region 5**
- **Tom Burke, EPA's Office of Research and Development**

This is a serious issue.

- **There should not have been any disrespect or discredit.**
- **For any of that, I apologize.**
- **I have to take responsibility for letting that happen – I am addressing it.**

Miguel Del Toral Memo

1. Technical assistance
2. Additional corrosion controls
3. Additional sampling
4. Review of our protocols and our actions incorporate his recommendations

Recommendations are spot on -

- What was discussed was: "No longer providing corrosion controls"
- Absence of corrosion controls
- There are multiple corrosion control technologies

- I am asking that we use consistent protocols and am looking to EPA for guidance.
- I have been in discussions with Susan Hedman.
- I don't know the answer to that, but I will get you an answer.
- I have staff who knows.

* Why did it take so long? Wished Sooner? We support the City's Decision.

1. We, the DEQ, have been there from the beginning addressing the issue of Flint water – compliance.
2. Recent 2nd round test results justify and require these actions.
3. These steps are intended to address the short- and long-term and ensure public safety and confidence.

This is a serious issue.

- We are addressing the issue.
- Go to work!
- Fix the problem!

* Lime Softening Can Affect the PH in H_2O
* PH Affect leaching
* Lead Copper Rule Requires 2 Consecutive Monitoring
* DEQ promptly notified EPA

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

November 9, 2015

Mr. Michael Glasgow
Utilities Administrator
City of Flint
4500 North Dort Highway
Flint, Michigan 48505

WSSN: #2310

Dear Mr. Glasgow:

SUBJECT: Water Supply – City of Flint (City) – Compliance Communication
Lead and Copper Rule Compliance Sampling Sites

The City community water system is subject to the requirements of the Michigan Safe Drinking Water Act, 1976 Public Act 399, as amended (Act 399). According to Department of Environmental Quality (DEQ) records, City reports submitted to the DEQ regarding Lead and Copper Rule (LCR) compliance monitoring information have been certified by the City that all LCR compliance monitoring since 1992 has been conducted at sampling sites meeting the Tier 1 criteria listed under subrule 1c of administrative rule 710a (R325.10710a).

The City's recent efforts to electronically convert customer service line information and statements by some of the City's certified operators conflict with the information provided in the City's LCR compliance monitoring certification reports.

Therefore, the DEQ is hereby requesting the City provide additional information and documentation regarding all 324 historic LCR compliance sampling sites.

As of November 3, 2015, the City's electronic database of customer service connections listed 10,895 records of converted customer service connection index cards. The City has recently indicated it has a total of 29,072 customer service connections, leaving approximately 18,177 records left to be converted. These digital records include a listing of the service line material.

The DEQ has obtained a copy of these 10,895 digital records and cross referenced them with the addresses for the City's 324 historic LCR compliance monitoring sites. However, only 46 of the 324 sites were able to be matched at the current time. Of these 46 sites, only 6 sites contained information confirming the Tier 1 site criteria based on having lead service line materials. 14 sites were listed as having no available information (n/a), and require additional documentation to justify being designated as a Tier 1 sample site having a lead service line. The remaining 26 cross referenced sites were listed as having copper service line materials which directly conflicts with the City's LCR reports certifying these sites as Tier 1 based on the criteria of having a lead service line. The City needs to provide additional information to the DEQ demonstrating these sites meet the Tier 1 site criteria or we will assume they do not.

The City's remaining 278 historic LCR compliance sampling sites must also be reviewed and will require additional documentation to justify being designated as Tier 1 sample sites.

Our office has provided the enclosed table that lists all 324 of the City's historic LCR compliance monitoring sites, when each site was utilized, the City's certification information for each site, and information cross referenced from the City's customer service line database. The City can use the far right column in this table, labeled *Justification of Lead Service Line and Tier 1 Criteria*, to summarize the City's justification for certifying these sites as Tier 1 and having a lead service line. Any supporting documentation regarding the justification for each site needs to be provided as separate attachments.

As a reminder, in accordance with subrule 1 of administrative rule 710a (R325.10710a), by January 1, 1992, the City was to have completed a materials evaluation of its distribution system to identify a pool of targeted sampling sites from which all first draw samples are collected. This evaluation was required to include information from:

- Special Monitoring for Corrosivity Characteristics
- All plumbing codes, permits, and records in the files of the building department or departments that indicate the plumbing materials installed within publically and privately owned structures connected to the water distribution system.
- All inspections and records of the distribution system indicating material composition of customer service connections.
- Water quality information that indicates locations which may be particularly susceptible to high lead or copper concentrations.

The completed table and all supporting documentation must be provided to our office as soon as possible, but by no later than December 30, 2015, prior to the next LCR compliance monitoring period.

Please contact me at 517-290-8817 or prysbym@michigan.gov at your earliest convenience to discuss this matter in more detail.

Sincerely,

Michael F. Prysby, P.E.
District Engineer
Lansing District Office
Office of Drinking Water and
Municipal Assistance

cc: Mr. Robert Bisnick, City of Flint
Mr. Brent Wright, City of Flint
Mr. Howard Kroft, City of Flint
Ms. Natasha Henderson, City of Flint
Mr. Jim Sygo, Chief Deputy Director, DEQ
Mr. Stephen Busch, DEQ
Mr. Adam Rosenthal, DEQ

Thelen, Mary Beth (DEQ)

From: Wyant, Dan (DEQ)
Sent: Thursday, October 08, 2015 5:40 PM
To: Scott, Allison (GOV); Muchmore, Dennis (GOV); Agen, Jarrod (GOV); Dickinson, Sarah (GOV); Emmitt, Beth (GOV); Snyder, Rick (GOV)
Cc: Wyant, Dan (DEQ)
Subject: Flint Drinking Water Action Plan Update - FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGED

Importance: High — IS THE COUNTY WILLING TO PULL THE SAMPLES ?

GEORGE CALL GCHD MARK V. WHO DO YOU WANT AS POC -

Dear Governor,

Below are our 26 action steps we are working on:

26 Action Steps for Next Week, October 12-16, 2015

1. Identify schools and prioritize for assessment [redacted]. GCISD, GCHD DEQ, DHHS, FLINT STEVE BUSCH POINT
2. Get DLARA plumbers organized DEQ, DLARA STEVE B POINT
3. Complete sampling instructions DEQ PAT COOK (DHHS & EPA)
4. MDARD info for restaurants MDARD, DHHS, DEQ DANA [redacted] DEBRYUN
5. Update 2004 letter to EPA DEQ, DANA DEBRYUN
6. Approve Flint plan for water line DEQ, FLINT, GENESSEE CO. MIKE PRYSBY
7. Lead education plan for schools for Drinking Water DHHS DEQ LIANE
8. Begin regular meetings with Flint DEQ FLINT GEORGE KRISTIAN POINT
9. Schedule WTP tour DEQ FLINT GEORGE KRISTIAN POINT
10. Meet with schools and DLARA-invitation only DEQ FLINT SCHOOLS KAREN T.
11. Update Web page DEQ KAREN T → RE EMERGENCY DECLARATION
12. Contact DHHS to see where they are with United Way DEQ DHHS [redacted] GEORGE
13. Circulate protocol draft with EPA DEQ EPA LIANE
14. Contact City about homeowner sample delivery DEQ FLINT GEORGE FLINT DEQ / MDARD
15. Communicate to MDARD and City that business samples should be coordinated though lab LIANE
16. Figure out number of samples from schools and child care facilities LIANE PAT STEVE
17. Confirm Lynda Dykema is POC for DHHS DEQ GEORGE DONE
18. Contact KWA to find out if there are any bottlenecks we need to remove DEQ KWA MIKE
19. Expedite 399 Plan and Phosphate Plan CITY DEQ MIKE ?
20. Get update on service line index card conversion and identify where partial replacements exist
21. Make sure DHHS gets info so they can cross reference DEQ DHHS STEVE [redacted] DEQ, FLINT STEVE
22. Legislative contacts DEQ MAGGIE
23. Legislative time line and summary DEQ MAGGIE
24. Dan reconnect with state superintendent [redacted] DAN WYANT MARY BETH TO SCHED
25. Conduct After Action Plan DEQ GEORGE TO SCHEDULE FOR THURSDAY 10/15/15
26. Change Part 54-Drinking Water Revolving Loan Fund MAGGIE, LIANE, SONYA BUTLER DEQ, TREES, EPA

GEORGE CALL FLINT

If you have any questions, please let me know.

Dan Wyant

DEQ's 18 Point Partnering Plan

11/20/15
11/23/15

1. **After Action Plan (FAQ) will be ready by noon November 16, 2015**
   - First version complete – updated as needed

   LANE TO SHARE TIMELINE WITH ATTORNEY GENERAL & FAQ

2. **School Test Data**
   - School reports to be expedited
   - Steve Busch creates summary reports
   - George Krisztian creates summary spreadsheet

   EISENHOWER & SHERIDAN REPORT FINALIZED ON 11/23/15

   * GEORGE TO SEND EISENHOWER FINAL TO TIM & SUPERINTENDENT *

3. **Blood exposure**
   - DHHS is lead on providing data

4. **Meeting with Mayor Karen Weaver**
   - Harvey Hollins lead – Dan Wyant, Jim Sygo and George Krisztian to attend

   12/3/15 AT 10:00 AM GOV'S OFFICE

5. **Messaging our Partnering Plan**
   - Provide ongoing public updates regarding Governor's 10 point plan
   - Continue emphasis on the availability of free testing for Flint residents
   - OEA to direct the Public to the "Flintwater" website

6. **Sampling Protocol**
   - Establish alignment with EPA Region 5 on sampling protocol

   UNIT REVAMP & SEND BY THE END OF NEXT WEEK

7. **Lead service line replacement**
   - Expand RLF directed at lead service line replacement
   - Amy Epkey, Maggie Pallone and Sonya Butler

   MAGGIE TO LEAD

8. **Partner with EPA**
   - Jim Sygo → Bob Kaplan
   - Dan Wyant → Susan Hedman
   - Mike Prysby and Steve Busch → Darren Lytle and Mike Schock
   - George Krisztian → Tom Burke
   - ODWMA Staff → EPA Region 5 Staff (Jennifer Crooks and Tom Poy

9. **Meet with Mott Foundation to discuss Lead Service Line Identification Study**

   AFTER WE MEET WITH THE MAYOR

10. **Lead Education Program**
    - DHHS is the lead on Lead Education Program



11. Moving KWA forward

- Proactive meetings with KWA

12. Participate actively with Technical Advisory Council

EPA TASK FORCE MEETING WITH FLINT EPA & DEQ (12/1 IN FLINT 9:00AM)

13. Utilize Joan Rose and MSU water expertise

11/30 AT 9:45 AM AT CON HALL

14. Public Outreach

- Mayor Karen Weaver SCHEDULED
- Genesee County Health Department
- Drs. Lawrence Reynolds, Eden Wells and Matthew Davis
- Ministers
- Land Bank
- Legislators
- Citizens

15. Outreach to schools

NEED TO RESCHEDULE MEETING WITH SUPER'S CONTACT

- EPA guidance on testing — LEAD & COPPER SAMPLING DOCUMENT BEING DRAFTED
- Work with state superintendent
- ODWMA Staff to work on Literature
- SCHOOL PILOT (HOLT/DIAMONDALE?)

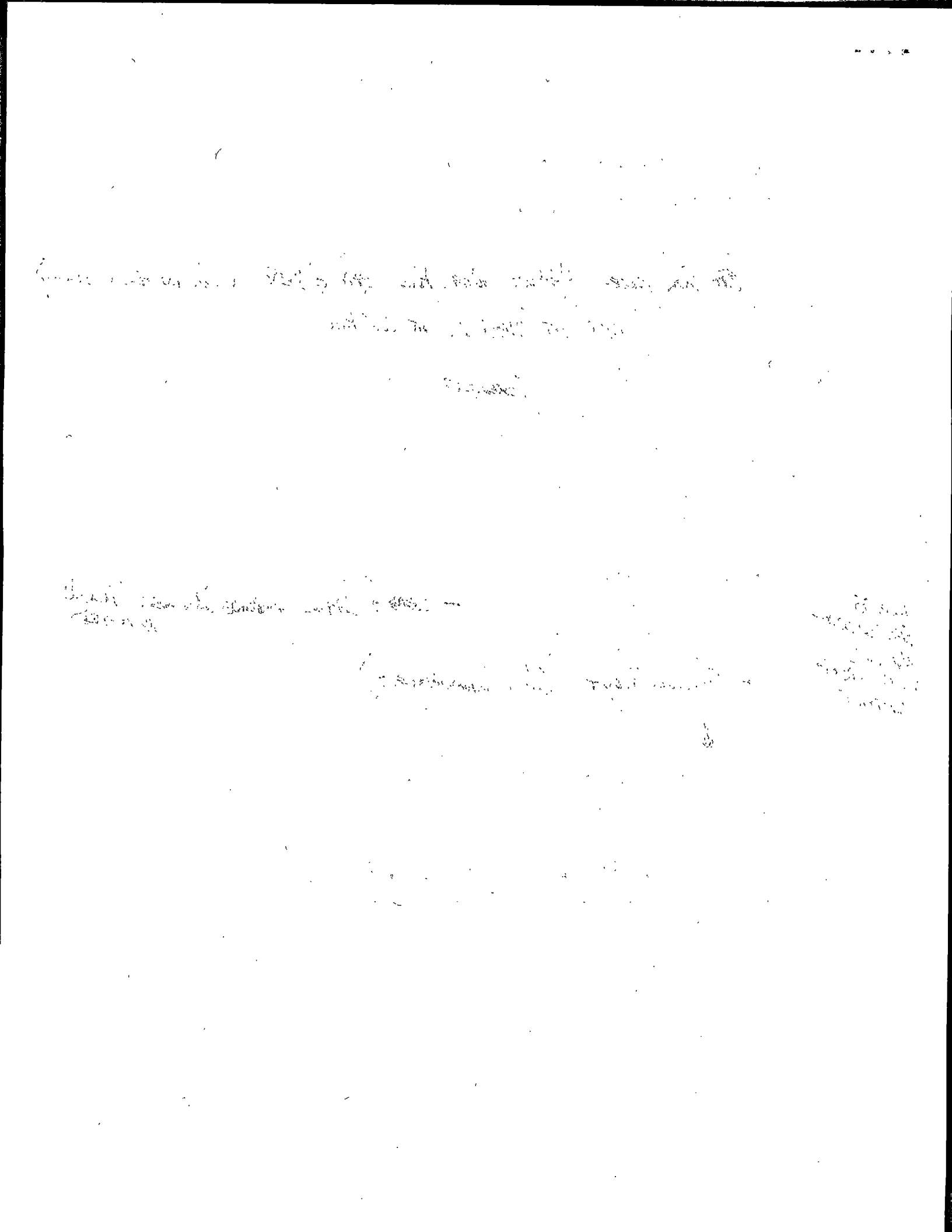
16. Make recommendations to EPA about LCR

NO

17. Compliance Communication letter sent November 9, 2015

- Wait until after Dec 30th

18. Enhance Coordination with Health Officials regarding personal health notifications of drinking water issues.



Summary of Flint Water Date Timeline and Background Information

Overall

- The health and welfare of Flint residents is a top priority and Governor Snyder is committed to a coordinated approach with resources from state agencies to address all aspects of this situation.
- Governor Snyder has requested support from the Federal Emergency Management Agency (FEMA) to coordinate with other federal agencies to provide resources to Flint as we work on short-term and long-term solutions for residents.
- When Governor Snyder became aware that the city of Flint's water showed elevated lead levels and that the state's handling of the situation was being questioned, he requested funding to switch the source back to the Great Lakes Water Authority and appointed an independent task force to identify possible missteps and areas for improvement.
- On Jan. 11 Gov. Snyder created the Flint Water Interagency Coordinating Committee (FWIACC), which will bring together a wide range of experts to work on long-term solutions to the Flint water situation and ongoing public health concerns affecting residents. The FWIACC is made up of experts from government and the Flint community and will set a course of action to remedy the water situation and resulting health issues, and carry on long after the emergency declaration expires.
- The independent Flint Water Task Force is continuing a full review of all local, state and federal actions that led to the current situation in Flint. A detailed report will be released upon completion.

In response to initial findings from the Flint Water Task Force, Governor Rick Snyder accepted the resignation of the Director of the Michigan Department of Environmental Quality.

Here is a summary timeline of the Flint water events:

2006

January: Discussions regarding Karegnondi Water Authority start.

2013

March: Flint City Council votes 7-1 to join the Karengondi Water Authority.

April 16: City of Flint Emergency Manager Ed Kurtz signs agreement to switch from Detroit Water and Sewerage Department water source to KWA. (OAG) DWSD sets termination of Flint water service for April 17, 2014.

April 17: DWSD said it will stop selling water to the City of Flint in April 2014.

June: Flint notifies the DEQ of intent to operate the Flint Water Treatment Plant full-time using Flint River for drinking water.

2014

Mid-March: City of Flint decides to use the Flint River as a water source.

April: DEQ issues Flint Water Treatment Plant construction permits for full-time operation enhancements.

August 4: Meeting with Governor's Office and Flint pastors.

August 17: DEQ notifies the Flint WTP of the second six-month lead/copper monitoring results.

August 23: Virginia Tech researcher, Marc Edwards, notifies the DEQ that he will begin a study of the City of Flint water quality.

August 24: Dr. Mona Hanna Attisha from Hurley Hospital contacts Genesee County Health Department for blood lead level data/information.

August 28: Concerned Pastors announce water filter giveaway in Flint.

September 2: Virginia Tech researcher, Marc Edwards, indicates that the corrosiveness of the Flint water is causing lead to leach into the residents' water.

September 24: Hurley Medical Center study issued showing high blood lead levels in City of Flint Children.

September 25: Flint issues lead advisory regarding drinking water

September 29: Dr. Eden Wells, State Medical Officer, contacts Dr. Mona Hanna Attisha regarding her study results.

September 30: Briefing to Director Lyon comparing Lead Copper Rule Testing (EPA protocol) and Marc Edwards protocol.

October 1: Michigan Department of Health and Human Services confirms results of Hurley Medical Center Study.

October 1: MDHHS provides information for Flint Water website, including the following documents: Parent Handbook: Is Your Child Safe From Lead Poisoning, Blood Lead Level Quick Reference for Primary Care Providers, Lead Screening & Testing for Safe, Healthy Michigan Kids, and finally, Pregnant and Nursing Mothers: What You Need to Know.

October 1: City of Flint, Genesee County Health Department urge residents to not drink water.

October 2: MDHHS determines its study results are now consistent with Hurley findings, Gov. Snyder announces comprehensive action plan to address Flint water issues. State Budget Office approval to use carryover emergency funds and transfer of DEQ funds to purchase water filters.

October 2: Genesee County Health Department school screening water samples collected for analysis.

October 5: MDHHS announces water filters will be available to the public on Oct. 6.

October 7: Flint Technical Advisory Board meets, recommends reconnection to Detroit water.

October 8: Gov. Snyder conducts press conference in Flint, announces plan to reconnect to Detroit water.

October 8: City of Flint develops plan to reconnect to DWSD.

October 15: Gov. Snyder signs bill authorizing funding for Flint to move back to Detroit water system.

- Identify federal agencies that have programs, authorities, and technical expertise to assist
- At this point there is not a federal declaration. FEMA is not currently sending supplies to this incident.

- In addition to requesting support from FEMA, the Governor has activated the Michigan National Guard to help our local volunteers distribute supplies at the five water resource sites.
  - The resource sites are open seven days a week from 9 a.m. to 9 p.m. at Flint fire stations.
    - Fire Station #1 310 East 5th St. Flint, MI 48502
    - Fire Station #3 1525 Martin Luther King Ave. Flint, MI 48503
    - Fire Station #5 3402 Western Rd. Flint, MI 48506
    - Fire Station #6 716 West Pierson Rd. Flint, MI 48505
    - Fire Station #8 202 East Atherton Rd. Flint, MI 48507
  - There are water resource teams going door to door to ensure every resident has a water filter and additional water resources
  -
  - Residents who need immediate help should call 211 or the governor's office at 517-335-7858
    - 211 is open 24/7/365
    - To assist the residents of Flint, Governor Snyder's office has committed ensure the constituent relations division will be open 7 days per week from 8 am until 5 pm until further notice.
- The Michigan State Police continue to lead the door to door mission of reaching every Flint resident. They are assisted by the Genesee County Sheriff's office, state of Michigan employees, and volunteers from organizations such as the American Red Cross.
- One of our top priorities is ensuring Flint residents know the resources that are available to them. We have used direct mail, automated calls, emails and bill boards to ensure residents know that information on water resources is available by calling 211 or visiting www.michigan.gov/FlintWater

Additional information

Corrosion Control (From DEQ)

- On October 16, 2015 Flint returned to using water supplied by DWSD. The water supplied by DWSD is a finished product ready to use and already has phosphate added to it to assist with corrosion control.

- Recognizing that the level of phosphate in the water from DWSD was designed to be a maintenance dosage, the DEQ and the Flint worked together to bring online supplemental phosphate addition so as to speed up the rebuilding of the protective layer in the distribution system.

- On October 28, 2015 the MDEQ issued a construction permit to Flint for the supplemental corrosion controls.

Briefing: Flint Water System Press Conference
Thursday, Oct. 8, 2015
Mott Foundation/Commerce Center Building Ground Floor
519 S. Saginaw St., Flint
Communications: Sara Wurfel, 517-599-3470, wurfels@michigan.gov
Dave Murray, 517-449-8343, murrayd1@michigan.gov

Purpose:

We're announcing the decision to reconnect Flint to the Detroit Water and Sewerage Department, a collaborative effort between the state government, Flint city government and the Mott Foundation.

High level points:

- Protecting the health and safety of our residents in Flint and across Michigan is always our top priority.
  - All Michigan residents need access to safe, clean water.
- That's why today, in consultation with health and water experts in our state agencies, I'm advocating reconnecting the Flint drinking water with the Great Lakes Water Authority.
- I'm recommending to my partners in the Legislature that the state government provide $6 million of the needed $12 million to reconnect with authority.
  - The Flint city government has agreed to cover $2 million of this cost, and the Charles Stewart Mott Foundation is generously offered to donate $4 million.
- What you are seeing here today is a community coming together to work toward solving a problem.
  - I appreciate the assistance of Mayor Walling, and the U.S. Environmental Protection Agency.
  - This is a collaborative approach, and I appreciate that community organizations including the United Way and come forward to assist.

Agenda:

9:00 AM - 9:45 AM	Gov meets with Mayor Walling in [Room 1]
9:45 AM – 10:00 AM	Pre-Brief in [Room 2]
10:00 AM – 10:01 AM	Harvey Hollins kicks off press conference; introduces Governor
10:01 AM – 10:05 AM	Governor gives remarks
10:05 AM – 10:06 AM	Harvey Hollins introduces Mayor Dayne Walling
10:06 AM – 10:10 AM	Mayor Walling gives remarks
10:10 AM – 10:11 AM	Harvey Hollins introduces DEQ Director Dan Wyant
10:11 AM – 10:15 AM	Director Wyant gives remarks
10:15 AM – 10:16 AM	Harvey Hollins introduces DHHS Director Nick Lyon
10:16 AM – 10:17 AM	Director Nick Lyon introduces Dr. Eden Wells
10:17 AM – 10:20 AM	Dr. Eden Wells remarks
10:20 AM – 10:21 AM	Harvey Hollins introduces Ridgway White of Mott Foundation
10:21 AM – 10:25 AM	Ridgway White gives remarks
10:25 AM – 10:35 AM	Q&A from the podium
10:35 AM	Event concludes; Governor departs

Attendees: Roughly 20 in audience

Susan	Borrego	Chancellor, U of M Flint
Oscar	Overton	Pastor
Alfred	Harris	Pastor

Latrelle	Holmes	Pastor
Jim	Ananich	Michigan Senate
Sheldon	Neely	Michigan House
Phil	Phelps	Michigan House
Jeff	Wright	Drain Commissioner, Genesee County
Amy	Hovey	Dan Kildee office
Jamie	Gaskin	Dan Kildee office
Tim	Herman	Flint Chamber of Commerce
Brian	Larkin	Flint Chamber of Commerce
Eric	Mays	Flint City Council
Jacqueline	Poplar	Flint City Council
Kerry	Nelson	Flint City Council
Joshua	Freeman	Flint City Council
Wantwaz	Davis	Flint City Council
Herbert	Winfrey	Flint City Council
Monica	Galloway	Flint City Council
Vicki	VanBuren	Flint City Council
Scott	Kincaid	Flint City Council

Speaker comments:

RDS – Collaboration led to solution, outline of solution
Mayor Walling – Importance of solution to Flint
Dan Wyant – School testing results, overview of steps on transition from Flint River to DWSD
Nick Lyon – DHHS involvement
Dr. Eden Wells – Testing of water going forward, use of filters approved by NSF
Ridgway White – Importance of collaboration/commitment to Flint

Talking points:

- Protecting the health and safety of our residents in Flint and across Michigan is always our top priority.
    - All Michigan residents need access to safe, clean water

- That's why today, in consultation with health and water experts in our state agencies, I'm advocating reconnecting the Flint drinking water with the Great Lakes Water Authority.

- I'm recommending to my partners in the Legislature that the state government provide $6 million of the needed $12 million to reconnect with authority.
    - The Flint city government has agreed to cover $2 million of this cost, and the Charles Stewart Mott Foundation is generously offered to donate $4 million.
    - The Michigan Department of Health and Human Services and the Department of Environmental Quality today also is committing an additional $3.5 million for water filters, free lead testing through the state laboratory for Flint water customers, and hiring additional staff to conduct health exposure monitoring for lead in drinking water.

- What you are seeing here today is a community coming together to work toward solving a problem.
    - I appreciate the assistance of Mayor Walling, and the U.S. Environmental Protection Agency.
    - This is a collaborative approach, and I appreciate that community organizations including the United Way and come forward to assist.

- Today's announcement in an important step as we move forward together.
    - But it is not our first step, nor will it be our last.

- This announcement builds on work we've already set in place.
    - That includes $4.2 million in state grants and loan restructuring to help identify and fix infrastructure problems.
    - State agencies have been working closely with Flint leaders and the community for more than a year.

- There will be more to do.
    - Flint has an aging water infrastructure system with challenges that we – together – will continue to address.

- We will continue to test Flint schools for lead levels in drinking water.
    - Schools across the state might also have questions.
    - The Department of Environmental Quality will work with districts across the state to provide testing.
        - Districts can send water samples and paperwork and the nominal charge. (It costs $26 per sample).

- The steps outlined in the comprehensive action plan are still in effect.

Summary of Department of Environmental Quality (DEQ) Actions
In Response to the
EPA Emergency Administrative Order
Updated: 01/29/2016 1743

- **Chapter 55 "Shall cooperate with EPA for conducting sampling and other diagnostic activities"**
  - EPA Order Due Date: 01/21/2016
  - The Testing/Sampling Group has been assigned this task.
    - *It is an ongoing process.*
  - Reference: USEPA
- **Chapter 60 "Shall not switch water supplies until plans have been submitted and approved"**
  - EPA Order Due Date: 01/21/2016
  - The Public Health Group has been assigned to this task and they have received an agreement.
    - *This task has been completed.*
- **Chapter 50 "Intent to Comply Letter"**
  - EPA Order Due Date: 01/22/2016
  - The Administrative Group was assigned this task.
    - *This task was completed on 01/22/2016.*
- **Chapter 51 "Public Website posting all reports, plans, weekly status reports on progress, except Personally Identifying Information (PII)"**
  - EPA Order Due Date: 01/26/2016
    The Administrative Group has been assigned to this task. The currently available information has been posted on the website and will be updated as more results become available.
    - *This is an ongoing task.*
  - A representative from the Administrative Group will be working with SEOC to add an EPA order section.
    - *This is an ongoing task.*
- **Chapter 63 "Shall engage a panel of experts to advise and make public recommendations to the city on steps needed to mitigate the imminent and substantial endangerment to the health of persons and general operation of the city's PWS to comply with SDWA & NPDWRs"**
  - EPA Order Due Date: 01/28/2016
  - The Administrative Group has been assigned to this task. A panel of experts had a meeting in Flint on 01/27/2016 at 3:00 p.m.
    - This is an ongoing task.
- **Chapter 52 "Is progress being made with corrosion control in the City? Respond to EPA Flint Task Force"**
  - EPA Order Due Date: 01/31/2016
  - The Public Health Group has been assigned to this task. The City of Flint is being asked to provide data.

        - *This task has been completed.*
    - EPA agreed on the dosing level for orthophosphate (01/27/2016).
        - *This task has been completed.*
    - Next step: Conduct weekly status calls with Flint Water Treatment Plant.
        - *This task has been completed.*
    - Review Monthly Operational Reports to ensure corrosion control treatment is appropriately maintained.
        - *Task is completed and ongoing.*
    - December Monthly Operations Submitted with Dosages (1st week of January). Data expected from City on 01/29/2016.
        - *Task has been completed.*
- **Chapter 53 "Water Quality parameter measurements in distribution system"**
    - EPA Order Due Date: 01/31/2016
    - The Public Health Group has been assigned to this task.
    - Ensure City conducts/provides WQP data as required and that during their weekly status call, they discuss WQP trends/concerns.
        - *Task is completed and ongoing. (A Monthly Operations Report has been sent to the DEQ by the City of Flint).*
- **Chapter 53 "All lead in water testing results for the city since January 2013 including those not used for LCR compliance"**
    - EPA Order Due Date: 01/31/2016
    - The Public Health Group has been assigned to this task.
        - *Task is completed and Ongoing.*
    - Provide to the Administrative Group so that they can vet and send to those who maintain website any lead results in DEQ files for monitoring since Jan 2013 (target 01/29/2016).
        - *Task is completed and Ongoing. (Residential test results have been posted on the web. Compliance data is being vetted by DEQ staff).*
    - Ensure ongoing monitoring results continue to be provided/posted to website.
        - *This task is ongoing.*
- **Chapter 53 "Identification of areas by zip code in the city with elevated blood levels"**
    - EPA Order Due Date: 01/31/2016
    - The Administrative Group has been assigned to coordinate with DHHS.
        - *Ongoing process.*
- **Chapter 54 "a. Existing inventory of homes with lead service lines in Excel or similar format"**
    - EPA Order Due Date: 01/31/2016
    - The Infrastructure Group and DNR GIS is assigned to this task or compiling this data. Would like to obtain a list of billing addresses that receive Flint Water to aid in mapping.
        - *This task has been completed.*
- **Chapter 54 "b. Addresses of homes that have had water service interruptions or street disturbances (e.g. water main breaks, etc.) within last year"**
    - EPA Order Due Date: 01/31/2016

- This task has been assigned to the Infrastructure and Public Health Groups.
  - *This task is ongoing.*
- The Infrastructure and Public Health Groups will call the City on 1/29/2016 to get update on status.
  - *Completed and awaiting information from the City of Flint.*

- **Chapter 54 "c. Addresses of currently unoccupied homes"**
  - EPA Order Due Date: 01/31/2016
  - This task has been assigned to the Infrastructure and Public Health Groups. MDEQ is working with the City of Flint Department of Public Works to acquire the data and map these locations. Would like to obtain information as to where water is turned off. State Emergency Operations Center (SEOC) will contact MSP. The information for this is not for public dissemination due to safety reasons.
    - *This is an ongoing task.*
- **Chapter 69 "Any agent, consultant or contractor used for carrying out this order shall also abide by record retention restrictions under this order"**
  - EPA Order Due Date: 01/31/2016
  - This task has been assigned to the Administrative Group. The recommended action is to comply with order and provide instruction. Assistant Attorney General (AAG) procured a Document Unit Leader.
    - *This is an ongoing task.*
  - All agents or contractors will be required to comply with the Retention Schedule of the EPA Order.
    - *This task is ongoing.*
  - Identify record retention elements and provide direction to all personnel, agents, or contractors that are or may become, involved with the Flint water incident. Also need to prepare a Documentation Unit Leader task list and identify resource(s) needed to fill the position. This was assign to the Assistant Attorney General.
    - *This task has been completed.*
- **Chapter 69 "Any agent, consultant or contractor used for carrying out this order shall also abide by record retention restrictions under this order"**
  - EPA Order Due Date: 01/31/2016
  - This task has been assigned to the Legal Team and the Administrative Group. The DOCUL will work with The AAG and Administrative Group to produce letter.
    - *This task is ongoing.*
  - It is recommended that a letter should be drafted from DEQ to the City of Flint.
    - *This task is ongoing.*
- **Chapter 59 "City shall submit to DEQ the following items listed below:"**
  - EPA Order Due Date: 02/04/2016
- **Chapter 59 "a. Submit a plan and schedule to MDEQ for designated optimal corrosion control and water quality parameters and water monitoring plans"**
  - EPA Order Due Date: 02/04/2016

- The Public Health Group has been assigned to this task.
- Confirm with City that they will have plans completed and submitted by 02/04/2016.

- **Chapter 59 "b. Submit a sampling plan for daily monitoring submitted in a weekly report"**
  - EPA Order Due Date: 02/04/2016
  - The Public Health Group and Infrastructure Group have been assigned to this task.
  - Confirm with the City that they will have plans completed and submitted by 02/04/2016.
- **Chapter 59 "C. Submit an operations plan for the corrosion control equipment submitted in weekly format including monitoring, calibration, verification and daily monitoring of finished water corrosion control parameters"**
  - EPA Order Due Date: 02/04/2016
  - The Public Health Group have been assigned to this task.
  - Confirm with the City that they will have plans completed and submitted by 02/04/2016.
- **Chapter 61 "City must demonstrate and MDEQ must ensure the city has necessary capable and qualified personnel to perform duties in PWS"**
  - EPA Order Due Date: 02/05/2016
  - The Public Health Group has been assigned to this task.
    - *This is an ongoing task.*
  - MDEQ to get list of all operators employed at treatment plant and validate that they are properly certified, and to provide appropriate targeted training for Flint operations staff.
- **Chapter 62 "City will document and share steps to develop and implement a distribution system water quality optimization plan to MDEQ"**
  - EPA Order Due Date: 02/20/2016
  - The Public Health Group has been assigned to this, in coordination with the City of Flint.
    - *This is an ongoing task.*
  - Establish realistic due date. MDEQ to contact national drinking water organization currently working on distribution system optimization plan framework.
  - City to submit proposal by (date) and MDEQ and EPA to review/evaluate proposal.
- **Chapter 68 "After six years must notify EPA 60 calendar days prior to destruction of any data pertaining to this order"**
  - EPA Order Due Date: 01/21/2016
  - The Administrative Group and the Legal Team have been assigned to this task.
  - To ensure consistency, retain all records following General Schedule #5, specifically GS5.10. When contacted regarding disposal, all records will be put on a litigation hold for one additional year, and not destroyed. U.S. EPA will be notified when the additional one-year litigation hold is put in place.
    - *This is an ongoing task.*
- **Chapter 57 "Shall maintain chlorine residual in the distribution system in accordance to SDW and National Primary Drinking Water Regulations (NPDWR)"**
  - EPA Order Due Date: Monthly
  - The Public Health Group has been assigned to this task.
    - *This has been completed and ongoing.*

- Regulatory requirements already in place for residual chlorine. City is required to monitor chlorine regularly and report on Monthly Operating Reports.
- Review Chlorine residual levels in weekly status calls.

- **Chapter 58 "City shall continue to add corrosion inhibitors at sufficient levels"**
  - EPA Order Due Date: Monthly
  - The Public Health Group has been assigned to this task.
    - *This is an ongoing task.*
- **Chapter 68 "Preserve records and data for six years"**
  - The Administrative Group and the Legal Team have been assigned to this.
    - *This is an ongoing task.*
  - To ensure consistency, retain all records following General Schedule #5, specifically GS5.10. When contacted regarding disposal, all records will be put on a litigation hold for one additional year, and not destroyed. Training will be conducted by DTMB Record Center to all DEQ staff to ensure consistency and understanding.
    - *This will be an ongoing task.*

FLINT SCHOOL TESTING RESULTS:

WHAT DID WE FIND?

1) The results of the initial screening conducted over the course of the last week are consistent with the last round of community lead and copper testing.

2) There were a total of 37 samples taken from 13 schools. Of those 37 samples, 4 exceeded the 15 ppb action level. There were 3 schools that had samples exceeding the action level: Eisenhower Elementary (which had two samples exceeding 15 ppb). Brownell STEM Academy and Freeman Elementary each had one sample exceeding 15 PPB. The sample from Freeman Academy was significantly higher than the other samples at 101 PPB.

3) Looking at the data from a health based perspective, the data clearly demonstrates that more detailed sampling needs to occur so that the various sources of lead contamination contained within each respective school's plumbing can be identified and addressed.

WHAT DOES THE DATA MEAN?

1) The data underscores the need for a complete and thorough evaluation of the plumbing system within each school.

2) We have developed a protocol for evaluating the plumbing systems and we will be working with schools to implement these protocols and to assist them in determining a corrective action plan to address this issue.

3) The State is identifying staff within DEQ, DHHS, LARA and Local County Health Departments to assist schools in conducting evaluations of their plumbing systems.

WHAT IS YOUR PROTOCOL?

1) DEQ's protocols are based on similar work done in Michigan and in other States.

2) Multiple samples from each tap used for cooking or drinking water will be collected at prescribed intervals to identify levels of lead and its likely source.

3) Once an evaluation is complete, we will be able to assist each School in developing a comprehensive plan to address issues on a site specific basis.

HOW DO SCHOOLS RESPOND?

1) Schools should continue protective measures that are currently in place until a complete study can be conducted at each school. This includes the continued use of bottled water for consumption purposes.

2) We will be reaching out to schools to schedule a complete evaluation, assessment and sampling, of their plumbing systems.

Congressional Energy and Commerce Task List

Update:	02/07/2016								
Date of Initiation	Named Party	Item #	Sub Item	Task	Due Date	Status	Recommended Action	Assigned Personnel	Comments
02/03/2016	MDEQ	1		Please describe the current and anticipated specific roles and responsibilities for federal, state and city authorities in responding to the Flint water emergency.	02/11/2016			Administration Group Lord/Kristztian	5 Prong Approach & Other Documents
02/03/2016	MDEQ	2		Please outline the procedures federal, state, and local authorities will take to assess the scope and levels of public exposure to lead and other contaminants of concern through the Flint drinking water system, including:	02/11/2016			Public Health Group Lord/Kristztian	5 Prong Approach & Other Documents
			a	Current available exposure information and lead levels in different parts of the drinking water system;	02/11/2016			Public Health Group Lord/Kristztian	5 Prong Approach & Other Documents
			b	The timing for completing this assessment;	02/11/2016			Public Health Group Lord/Kristztian	5 Prong Approach & Other Documents
			c	The benchmarks MDEQ and the U.S. Environmental Protection Agency's (EPA) consider necessary to determine that Flint's drinking water is safe for consumption and use.	02/11/2016			Public Health Group Lord/kristztian	5 Prong Approach & Other Documents

Update:	02/07/2016								
Date of Initiation	Named Party	Item #	Sub Item	Task	Due Date	Status	Recommended Action	Assigned Personnel	Comments
02/03/2016	MDEQ	3		Provide an estimate of the timing for corrosion control to provide sufficient coatings on service lines to reduce lead in the drinking water to safe levels, as well as any factors that could affect this timeline and the effectiveness of this approach.	02/11/2016			Public Health Group Lord/Kristztian	5 Prong Approach & Other Documents
02/03/2016	MDEQ	4		EPA's January 21, 2016 Emergency Order details several required actions by the Michigan Department of Environmental Quality and the City of Flint. Has MDEQ or the Flint's Public Water System provided the information requested by the EPA Flint Task Force in November to the EPA? If not, when does MDEQ anticipate providing a response to this request as required in paragraph 52 of EPA's January 21, 2016 order?	02/11/2016			Administration Group Lord	Flint Water Task Force Response from 1/26/2016
		5		Describe in detail when and how MDEQ learned that Flint had no corrosion control treatment in place.	02/11/2016			Administration Group Pallone	Flint Drinking Water Timeline
			a	When and how did MDEQ learn that Flint chose not to implement a corrosion control treatment?	02/11/2016			Administration Group Pryzby & Benzie	Timeline attachments 20,24 &25
			b	What is MDEQ's understanding of why Flint chose not to implement an optimized corrosion control treatment?	02/11/2016			Administration Group Pryzby & Benzie	Timeline attachments 20,24 &25

Update:	02/07/2016								
Date of Initiation	Named Party	Item #	Sub Item	Task	Due Date	Status	Recommended Action	Assigned Personnel	Comments
02/03/2016	MDEQ		c	At any time between April 2014 and April 2015, did MDEQ believe that Flint implemented an optimized corrosion control program or treatment? If so, please describe MDEQ's understanding of the optimized corrosion control program or treatment.	02/11/2016			Administration Group Pryzby & Benzie	Flint Drinking Water Timeline attachments 20,24 &25
			d	What was the extent, if any, to which Flint's treatment for controlling E. coli, and its resultant treatment for disinfection by-products (trihalomethanes), contributed to pipe corrosion?	02/11/2016			Administration Group Lord	Flint Water Advisrory Task Force FAQ Document
			e	Why did MDEQ not require Flint to have a corrosion control treatment in place at the time of the switch to Flint River water? Please describe the basis for this decision.	02/11/2016			Administration Group Lord	Flint Water Advisrory Task Force FAQ Document
			f	Did MDEQ or the Flint drinking water system perform or rely on an assessment of the Flint River water's quality, including information that might pertain to the potential of the Flint River's water to cause corrosion within the Flint drinking water system, prior to the use of the Flint River as a drinking water source?	02/11/2016			Administration Group Pallone	FOIA 0090-16

Update:	02/07/2016								
Date of Initiation	Named Party	Item #	Sub Item	Task	Due Date	Status	Recommended Action	Assigned Personnel	Comments
			g	What analyses, including but not limited to legal analysis, did MDEQ perform regarding the decision not to require Flint to implement a corrosion control treatment? Please provide copies of any memoranda reflecting this analysis, including any memoranda provided to EPA.	02/11/2016			Administration Group Pryzby & Benzie	Flint Drinking Water Time line, attachments 19, 20 & 25
02/03/2016	MDEQ	6		Please provide copies of all briefing materials prepared by MDEQ personnel for federal, state, and local officials from January 2013 through February 2016 relating to the Flint drinking water system, including the decision to use the Flint River as a drinking water source.	02/11/2016			Administration Group Pryzby & Benzie	No Existing Documentation
02/03/2016	MDEQ	7		Please provide copies of all briefing materials provided by EPA to MDEQ personnel from January 2013 through February 2016 relating to the Flint drinking water system.	02/11/2016			Administration Group Pryzby & Benzie	No Existing Documentation
02/03/2016	MDEQ	8		If EPA performed a compliance audit of Flint, Michigan's drinking water system under the Safe Drinking Water Act?	02/11/2016			Administration Group Sygo	Audits in 2013 & 2014
			a	When did such a compliance audit last occur?	02/11/2016			Administration Group Sygo	Audits in 2013 & 2014

Update:	02/07/2016								
Date of Initiation	Named Party	Item #	Sub Item	Task	Due Date	Status	Recommended Action	Assigned Personnel	Comments
		b		What actions, if any, did MDEQ undertake in response to EPA's review?	02/11/2016			Administration Group Sygo	Audits in 2013 & 2014

Thelen, Mary Beth (DEQ)

From:	Wyant, Dan (DEQ)
Sent:	Wednesday, October 07, 2015 7:09 PM
To:	Scott, Allison (GOV); Muchmore, Dennis (GOV); Agen, Jarrod (GOV); Dickinson, Sarah (GOV); Emmitt, Beth (GOV)
Subject:	Flint Drinking Water Action Plan Update - FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGED
Attachments:	City of Flint Water Funding Solution.pdf; FLINT SCHOOL TESTING RESULTS.DOCX; Drinking Water Regulations for Monitoring of Lead in Schools and Child C....doc; Response to Corrosion Control Questions.docx; Fwd: TAC Meeting Highlights; CC Meeting Minutes 3-25-2013 (1).doc; Flint.pdf; KWA Contract (amended) 130165.2.pdf

Governor Snyder,

I wanted to provide you with the attached documents to address a number of the questions that you are asking today. A full briefing for the press conference, including press release, talking points, run of show, and frequently asked questions, will be provided by your team. Included in this e-mail are the following attachments:

1. Flint Drinking Water FY 2016 supplemental budget request summary
2. Summary of the Flint schools water testing results and our response to the results
3. Drinking water regulations for monitoring lead in schools and child care centers
4. Response to the questions on corrosion control
5. Summary of today's Safe Drinking Water Technical Advisory Committee meeting
6. Flint City Council Minutes from March 25, 2013; the Resolution to Purchase Capacity from Karegnondi Water Authority; and the Amended Contract

Other Updates

Mayor Duggan and Sue McCormick of DWSD were contacted, briefed, and are supporting tomorrow's announcement. Both have indicated they would provide positive comments supporting the decision.

Dan Wyant

City of Flint Water - Funding Solution
State of Michigan Commitment

Agency	GF/GP	Gross	Comments
Filters:			
Health & Human Services	$1,016,000	$1,016,000	AY15 work project
Health & Human Services	$0	$1,000,000	DEQ State Restricted Settlement Funds provided to HHS Emergency Services local office (FY16 appropriation).
Subtotal Filters:	**$1,016,000**	**$2,016,000**	
Reconnect to DSW:			**Reconnection costs ~$1.3m/month x 9 mos. to be shared by state & Flint**
Environmental Quality	$5,000,000	$6,000,000	DEQ State Restricted Settlement Fund of $1m; balance GF/GP
Subtotal Reconnect:	**$5,000,000**	**$6,000,000**	
Testing Costs:			
Environmental Quality	$1,000,000	$1,000,000	Additional tests at state lab, cost per sample: $26
Subtotal Testing:	**$1,000,000**	**$1,000,000**	
Additional Agency Support:			
LARA	$0	$200,000	Support for plumbing inspectors to do schools (public and parochial) and health facilities (hospitals, Long Term Care, etc.).
MSHDA	$0	$249,900	
Health & Human Services	$600,000	$600,000	Follow-up on children with elevated blood levels
Environmental Quality	$300,000	$300,000	Home and school inspections.
Subtotal Additional Support:	**$900,000**	**$1,349,900**	
ALL TOTAL	**$7,916,000**	**$10,365,900**	

Response to Corrosion Control Questions

- Lime Softening can affect the pH in water
- The pH of the water is one physical characteristic that can affect the leaching of lead from pipes into the water
- As per the requirements in the Lead/Copper rule the Flint Water system was evaluated for two consecutive monitoring periods and the results of the monitoring demonstrated that further action was necessary.
- The DEQ promptly notified the Flint water system of the need for additional measures and the city of Flint promptly began putting together an action plan to address this need.

Thelen, Mary Beth (DEQ)

From: Sygo, Jim (DEQ)
Sent: Wednesday, October 07, 2015 6:00 PM
To: Thelen, Mary Beth (DEQ); Shaler, Karen (DEQ); Wyant, Dan (DEQ)
Subject: Fwd: TAC Meeting Highlights

Summary of advisory committee meeting

Sent from my iPhone

Begin forwarded message:

> **From:** "Prysby, Mike (DEQ)" <PRYSBYM@michigan.gov>
> **Date:** October 7, 2015 at 4:56:44 PM EDT
> **To:** "Sygo, Jim (DEQ)" <SygoJ@michigan.gov>
> **Subject: TAC Meeting Highlights**
>
> Below is a summary of the Flint TAC meeting to obtain the committee's endorsement to switch back to Detroit water.
> 1. The TAC endorses the switch back to the DWSD
> 2. Marc Edwards of VA Tech supports the switchover to DWSD with conclusion that Flint River water with corrosion control will still be 4 times more corrosive
> than water from DWSD after 5 weeks of treatment.
> 3. Genesee County states two weeks to prepare pipeline for re-use (flush, disinfect, sample, etc)
> 4. Supplemental corrosion control still needed with DWSD water and ACT 399 submittal can be made in approx one week.
> 5. No pros were brought to the table for staying on the Flint River.
>
> Sent from my iPhone

City of Flint, Michigan

Third Floor, City Hall
1101 S. Saginaw Street
Flint, Michigan 48502
www.cityofflint.com

Meeting Minutes - Draft

Monday, March 25, 2013

5:33 PM

Agenda amended to include Board of Hospital Managers appointments

Council Chambers

CITY COUNCIL

Scott Kincaid, President, Ward 9
Bryant W. Nolden, Vice President, Ward 3

Claudia Croom, Ward 1 ***Jacqueline Poplar, Ward 2***
Joshua M. Freeman, Ward 4 ***Bernard Lawler, Ward 5***
Sheldon A. Neeley, Ward 6 ***Dale K. Weighill, Ward 7***
Michael J. Sarginson, Ward 8

Inez M. Brown, City Clerk

CALL TO ORDER

President Scott Kincaid called the meeting to order at 5:33 p.m.

ROLL CALL

Councilperson Michael Sarginson arrived at 5:37 p.m.

Present: Councilperson: Councilperson Poplar, Vice President Nolden, Councilperson Freeman, Councilperson Lawler, Councilperson Neeley, Councilperson Sarginson, Kincaid, Councilperson Weighill and Councilperson Croom

PLEDGE OF ALLEGIANCE

Councilperson Sheldon Neeley led the Pledge of Allegiance.

SPECIAL ORDER

130217 Special Order/Information & Discussion/Karegnondi Water Authority (KWA)

A Special Order as requested by Council President Scott Kincaid to continue discussion and review of information on the Karegnondi Water Authority (KWA).

Presented

PETITIONS AND UNOFFICIAL COMMUNICATIONS

130193 Change to Digital/All Limited Basic Service Channels/Comcast Cablevision

Communication dated March 6, 2013, from Gerald W. Smith, Government Affairs Manager, Comcast, to Flint City Clerk, re: On or shortly after April 9, 2013, Comcast will convert all Limited Basic service channels -- including Public, Government and Educational Access (PEG) channels to digital format, and will provide customers with digital equipment.

This matter was Placed on File. The motion carried.

130199 Certified Letter/Loyst Fletcher, Jr. & Associates

Communication received from Loyst Fletcher, Jr. to Chief Legal Officer, re: He questions the tax-exempt status of Word of Life Christian Church, which received a tax bill from the city.

This matter was Placed on File. The motion carried.

130200 Local Approval Notice/Michigan Liquor Control Commission (MLCC)/Time Square/Ward 3

Local Approval Notice dated March 14, 2013, from MLCC to Flint City Clerk, re: The MLCC has received a request to transfer all stock in 2012 Class C license with Sunday Sales Permit (PM) and Dance Permit, located at 4522 N. Saginaw,

Flint, Michigan, 48505, Genesee County, held by the estate of Myra Seals, Inc., 1028 Cora Dr., Flint, MI 48532, to Carisa Mays Bishop, Personal Representative. [NOTE: Approval order enclosed.]

This matter was Placed on File. The motion carried.

130202 Local Approval Notice/Michigan Liquor Control Commission (MLCC)/D & R Market, Inc./Ward 6

Local Approval Notice dated March 6, 2013, and received March 15, 2013, from MLCC to Flint City Clerk, re: The MLCC has received an application from 2 AAR, LLC, requesting to Transfer Ownership of a Specially Designated Distributor (SDD) and Specially Designated Merchant (SDM) licensed business with Sunday Sales permit (PM) and Direct Connection-I to D & R Market, Inc., located at 1402-1404 N. Chevrolet, Flint, Michigan, 48504, Genesee County, from 2 AAR, LLC, 3079 Shattuck Arms Blvd., Apt. 5, Saginaw, MI 48603. [NOTE: The application was cancelled pursuant to a request from an attorney.]

This matter was Placed on File. The motion carried.

130204 Changes/Cable Channel Lineup/Comcast Cablevision

Communication dated March 18, 2013, from Gerald W. Smith, Government Affairs Manager, Comcast, to Flint City Clerk, re: effective on or about May 22, 2013, Fox Business Network/Fox Business Network HD (ch. 06/243) will from the Digital Preferred Service to the Digital Starter Service.

This matter was Placed on File. The motion carried.

130205 Media Alert/Flint Public Art Project/Announcement of Design Winner

Media Alert received via e-mail on March 19, 2013, from the American Institute of Architects (AIA), re: The Flint Public Art Project and the Flint Chapter of the AIA will announce the winner of the $25,000.00 grand prize in the inaugural Flat Lot competition to design and build a temporary summer pavilion on Flint's central downtown parking lot at 9:30 a.m. Thursday, March 21, 2013, at the John Gazall & Associates, Mott Building, 503 S. Saginaw Street, Flint.

This matter was Placed on File. The motion carried.

130207 Damage Claims

MAYFIELD, LINDA, 2518 Walter Street, Flint, MI (WARD 2)
LANE, WILLIE C., 3130 Concord Street, Flint, MI (WARD 6)

This matter was Placed on File. The motion carried.

COMMUNICATIONS FROM CITY OFFICIALS

130194 Press Release/City of Flint/Hiring of New Police Officers/Recruitment of Others

Press Release dated March 11, 2013, from Jason Lorenz, City of Flint Public

Information Officer, re: The City of Flint has seven new police officers on the job from the public safety millage passed last November by voters. The city's next step is to hold a recruitment drive by working with a local college, which will set up a Police Academy when the city has gathered sufficient interest from its efforts.

This matter was Placed on File. The motion carried.

130195 Press Release/City of Flint/Sunday Sales of Alcohol Before Noon Not Permitted on St. Patrick's Day

Press Release dated March 12, 2013, from Jason Lorenz, City of Flint Public Information Officer, re: The City of Flint will not be able to permit Sunday alcohol sales before noon this Sunday, March 17, St. Patrick's Day. While the city adopted a resolution to allow a one-time exception to the Sunday morning alcohol ban, the Michigan Liquor Control Commission has taken the position that the city cannot create a one-day exemption.

This matter was Placed on File. The motion carried.

130196 Flint City Council/Public Notice/Special City Council Meeting/March 18, 2013

Public Notice posted March 14, 2013, re: The Flint City Council will hold a Special City Council Meeting, followed by a Finance Committee Meeting, at 5:30 p.m. Monday, March 18, 2013, in the City Council Chambers, 3rd Floor, City Hall, to consider a contract with the Karegnondi Water Authority (KWA).

This matter was Placed on File. The motion carried.

130201 Emergency Financial Manager (EFM) Order #10/Grant Applications

Order #10 issued by Emergency Financial Manager on March 15, 2013, "Grant Applications," re: "all city officials, department heads, division heads and employees shall adhere to ...requirements regarding the approval of any and all grant applications on behalf of the City of Flint or grant applications submitted by others which in any way involves the financial, programmatic or personnel support by the City of Flint." The five requirements, including the stipulation that only the Emergency Financial Manager or City Administrator are authorized to accept grants on behalf of the city, are included in the order.

This matter was Placed on File. The motion carried.

130203 Press Release/City of Flint/Flint Lifelines/Meeting Announcement

Press Release dated March 16, 2013, from Jason Lorenz, City of Flint Public Information Officer, re: Flint Lifelines, formerly CeaseFire Flint, will hold community meetings on the fourth Thursday of each month, beginning at 1 p.m. Thursday, March 28, 2013 at Flint Northwestern High School. The meetings are open to the public.

This matter was Placed on File. The motion carried.

130206 Flint City Council/Public Notice/Finance Committee Meeting/March 20, 2013

Public Notice posted March 19, 2013, re: The Flint City Council will hold a Finance Committee Meeting at 5:30 p.m. Wednesday, March 20, 2013, in the City Council Committee Room, 3rd Floor, City Hall.

This matter was Placed on File. The motion carried.

130208 Flint City Council/Public Notice/Special Affairs Committee Meeting/March 25, 2013

Public Notice posted March 22, 2013, re: The Flint City Council will hold a Special Affairs Committee Meeting at 5 p.m. Monday, March 25, 2013, in the City Council Committee Room, 3rd Floor, City Hall. A regular City Council meeting will immediately follow in the Council Chambers.

This matter was Placed on File. The motion carried.

130209 Traffic Engineering/Note for Bulletin/Street-Sidewalk-Lane Closures

Notes for Bulletin (3) dated February/March 2013, for street, sidewalk, or lane closures, re: (1) Harrison Street, Saginaw Street and Second Avenue (cable failure-March 11-March 20); (2) First Street, Harrison Street, Wallenberg, Kearsley, Crapo, Horrigan, and Harrison (St. Patrick's Day Pot O' Gold 4-Mil Run/Walk-March 17); and (3) Chevrolet Avenue (University Corner Grand Opening-March 22).

This matter was Placed on File. The motion carried.

Passed The Consent Agenda

A motion was made. The motion carried.

PUBLIC SPEAKERS

ROLL CALL

Councilperson Dale Weighill left at approximately 7 p.m.

Present: Councilperson: Councilperson Poplar, Vice President Nolden, Councilperson Freeman, Councilperson Lawler, Councilperson Neeley, Councilperson Sarginson, Kincaid and Councilperson Croom

Absent: Councilperson: Councilperson Weighill

APPOINTMENTS

130169.1 Amendment/Reappointment/Zoning Board of Appeals/Christine Monk (Ward 6)

Amended resolution resolving that the Flint City Council recommends the reappointment of Christine Monk (821 Frank Street, Flint MI 48504 - Ward 6), to the Zoning Board of Appeals for a three-year term, commencing September

1, 2011, and expiring September 1, 2014. [By way of background, Ms. Monk's term on the Zoning Board of Appeals expired in September 2011, but she has continued since that time to serve.] [Resolution amended to fix typographical error in first paragraph of resolution from "Board of Review" to "Zoning Board of Appeals."]

Sponsors: Sheldon A. Neeley

A motion was made by Councilperson Neeley, seconded by Councilperson Freeman, that this matter be Approved. The motion carried by the following vote:

Aye: 8 - Councilperson Poplar, Vice President Nolden, Councilperson Freeman, Councilperson Lawler, Councilperson Neeley, Councilperson Sarginson, President Kincaid and Councilperson Croom

Absent: 1 - Councilperson Weighill

130211 Appointment/Zoning Board of Appeals/Chris Zuwala (Ward 4)

Resolution resolving that the Flint City Council recommends the appointment of Chris Zuwala (3510 Whittier Avenue, Flint MI 48506 - Ward 4) to the Zoning Board of Appeals for a three-year term, expiring September 1, 2013. [NOTE: By way of background, Gloria Kelly's term as the 4th Ward representative expired in September 2007, but she continued to serve until resigning in January 2013.]

Sponsors: Joshua M. Freeman

A motion was made by Councilperson Freeman, seconded by Councilperson Poplar, that this matter be Approved. The motion carried by the following vote:

Aye: 8 - Councilperson Poplar, Vice President Nolden, Councilperson Freeman, Councilperson Lawler, Councilperson Neeley, Councilperson Sarginson, President Kincaid and Councilperson Croom

Absent: 1 - Councilperson Weighill

130212 Reappointment/Zoning Board of Appeals/Birdie V. Brooks (Ward 5)

Resolution resolving that the Flint City Council recommends the reappointment of Birdie V. Brooks (1307 Columbia Lane, Flint MI 48503 - Ward 5), to the Zoning Board of Appeals for the remainder of a three-year term, expiring September 1, 2014. [By way of background, Ms. Brook's term on the Zoning Board of Appeals expired in September 2011, but she has continued since that time to serve.]

Sponsors: Bernard Lawler

A motion was made by Councilperson Lawler, seconded by Councilperson Neeley, that this matter be Approved. The motion carried by the following vote:

Aye: 8 - Councilperson Poplar, Vice President Nolden, Councilperson Freeman, Councilperson Lawler, Councilperson Neeley, Councilperson Sarginson, President Kincaid and Councilperson Croom

Absent: 1 - Councilperson Weighill

130213

Resolution resolving that the Flint City Council recommends the reappointment of Marcia Braden (984 Barney Avenue, Flint MI 48503 - Ward 8), to the Zoning Board of Appeals for the remainder of a three-year term, expiring September 1, 2014. [By way of background, Ms. Braden's term on the Zoning Board of Appeals expired in September 2011, but she has continued since that time to serve.]

Sponsors: Michael J. Sarginson

A motion was made by Councilperson Sarginson, seconded by Councilperson Freeman, that this matter be Approved. The motion carried by the following vote:

Aye: 8 - Councilperson Poplar, Vice President Nolden, Councilperson Freeman, Councilperson Lawler, Councilperson Neeley, Councilperson Sarginson, President Kincaid and Councilperson Croom

Absent: 1 - Councilperson Weighill

130214 Reappointment/Zoning Board of Appeals/David C. Veasley (Ward 9)

Resolution resolving that the Flint City Council recommends the reappointment of David C. Veasley (2618 Pinetree Drive, Flint MI 48507 - Ward 9), to the Zoning Board of Appeals for the remainder of a three-year term, expiring September 1, 2015. [By way of background, Mr. Veasley's term on the Zoning Board of Appeals expired in September 2009, but he has continued since that time to serve.]

Sponsors: Scott Kincaid

A motion was made by Councilperson Freeman, seconded by Vice President Nolden, that this matter be Approved. The motion carried by the following vote:

Aye: 8 - Councilperson Poplar, Vice President Nolden, Councilperson Freeman, Councilperson Lawler, Councilperson Neeley, Councilperson Sarginson, President Kincaid and Councilperson Croom

Absent: 1 - Councilperson Weighill

130215 Appointment/Genesee County Land Bank Citizens' Advisory Council/Anthony Tucker (Ward 4)

Resolution resolving that the Flint City Council recommends the appointment of Anthony Tucker (2960 Henry Street, Flint MI 48506 - Ward 4) to the Genesee County Land Bank Citizens' Advisory Council for the remainder of a three-year term, expiring in January 2016. [NOTE: By way of background, Dan Anderson's term as the 4th Ward representative expired in January 2013.]

Sponsors: Joshua M. Freeman

A motion was made by Councilperson Freeman, seconded by Councilperson Poplar, that this matter be Approved. The motion carried by the following vote:

Aye: 8 - Councilperson Poplar, Vice President Nolden, Councilperson Freeman, Councilperson Lawler, Councilperson Neeley, Councilperson Sarginson, President Kincaid and Councilperson Croom

Absent: 1 - Councilperson Weighill

130218 Reappointment/Hurley Board of Hospital Managers/Philip W. Shaltz

Resolution resolving that the Flint City Council approves the reappointment of Philip W. Shaltz (14144 Moffet Drive, Fenton, MI 48430) to an additional five-year term on the (Hurley) Board of Hospital Managers, with such term to commence May 1, 2013, and expire April 30, 2018.

A motion was made by Councilperson Freeman, seconded by Vice President Nolden, that this matter be Approved. The motion carried by the following vote:

Aye: 8 - Councilperson Poplar, Vice President Nolden, Councilperson Freeman, Councilperson Lawler, Councilperson Neeley, Councilperson Sarginson, President Kincaid and Councilperson Croom

Absent: 1 - Councilperson Weighill

130219 Appointment/Hurley Board of Hospital Managers/Delrico Loyd

Resolution resolving that the Flint City Council approves the appointment of Delrico Loyd (2641 Westwood Parkway, Flint, MI 48507) to a five-year term on the (Hurley) Board of Hospital Managers, with such term to commence May 1, 2013, and expire April 30, 2018. [By way of background, Carl E. Mason was appointed in June 2008; his term expires April 30, 2013.]

Approved

Substituted

A motion was made by Councilperson Neeley, seconded by Councilperson Lawler, that this matter be POSTPONED for March 27, 2013. The motion failed by the following vote:

Aye: 3 - Councilperson Lawler, Councilperson Neeley and Councilperson Sarginson

No: 5 - Councilperson Poplar, Vice President Nolden, Councilperson Freeman, President Kincaid and Councilperson Croom

Absent: 1 - Councilperson Weighill

Substituted

A motion was made by Vice President Nolden, seconded by Councilperson Freeman, that this matter be Approved. The motion carried by the following vote:

Aye: 5 - Councilperson Poplar, Vice President Nolden, Councilperson Freeman, President Kincaid and Councilperson Croom

No: 3 - Councilperson Lawler, Councilperson Neeley and Councilperson Sarginson

Absent: 1 - Councilperson Weighill

130220 Appointment/Hurley Board of Hospital Managers/Donna Poplar

Resolution resolving that the Flint City Council approves the appointment of Donna Poplar (5277 Kimberly Woods Circle, Flint, MI 48504) to a five-year term

on the (Hurley) Board of Hospital Managers, with such term to commence May 1, 2013, and expire April 30, 2018. [By way of background, Frances Gilcreast was appointed in August 2008; her term expires April 30, 2013.]

Approved

Substituted

A motion was made by Councilperson Lawler, seconded by Councilperson Neeley, that this matter be POSTPONED for March 26, 2013. The motion carried by the following vote:

Aye: 7 - Councilperson Poplar, Vice President Nolden, Councilperson Lawler, Councilperson Neeley, Councilperson Sarginson, President Kincaid and Councilperson Croom

No: 1 - Councilperson Freeman

Absent: 1 - Councilperson Weighill

RESOLUTIONS

130165.1 Amended Resolution/Contract/City of Flint/Karegnondi Water Authority (KWA)

Amended resolution resolving that city officials are authorized to enter into a contract with Karegnondi Water Authority (KWA) to purchase fifteen (15) units of capacity, AND, resolving that the City Administrator is authorized to provide KWA information needed to administer the contract, and, with approval of the Chief Legal Officer, to make minor (non-material) modifications to the contract. [NOTE: For each unit of capacity that a member purchases, the buyer shall pay to the KWA a one-time fee of $32,300. Additionally, the buyer shall pay to the KWA not less than $32,300.00 per unit per year until such time as water is made available to the buyer. After water is made available, the buyer shall pay to the KWA an estimated amount NOT-TO-EXCEED $355,300.00 per unit per year until such time that the bonds are paid in full. If it is determined that the costs per unit will exceed $355,300.00, the buyer has a right to cancel the contract. Over the next 25 years, it is expected that continuing with Detroit will cost the region $2.1 billion, compared to $1.9 billion with a pipeline.] [NOTE: Contract not included.] [NOTE: Resolution amended from 18 to 15 units of capacity.]

A motion was made by Councilperson Neeley, seconded by Councilperson Freeman, that this matter be Amended. The motion carried by the following vote:

Aye: 5 - Vice President Nolden, Councilperson Freeman, Councilperson Lawler, Councilperson Neeley and Councilperson Sarginson

No: 3 - Councilperson Poplar, President Kincaid and Councilperson Croom

Absent: 1 - Councilperson Weighill

130165.2 Amended Resolution/Contract/City of Flint/Karegnondi Water Authority (KWA)

Amended resolution resolving that city officials are authorized to enter into a contract with Karegnondi Water Authority (KWA) to purchase sixteen (16) units

of capacity, AND, resolving that the City Administrator is authorized to provide KWA information needed to administer the contract, and, with approval of the Chief Legal Officer, to make minor (non-material) modifications to the contract. [NOTE: For each unit of capacity that a member purchases, the buyer shall pay to the KWA a one-time fee of $32,300. Additionally, the buyer shall pay to the KWA not less than $32,300.00 per unit per year until such time as water is made available to the buyer. After water is made available, the buyer shall pay to the KWA an estimated amount NOT-TO-EXCEED $355,300.00 per unit per year until such time that the bonds are paid in full. If it is determined that the costs per unit will exceed $355,300.00, the buyer has a right to cancel the contract. Over the next 25 years, it is expected that continuing with Detroit will cost the region $2.1 billion, compared to $1.9 billion with a pipeline.] [NOTE: Contract not included.] [NOTE: Resolution amended from 15 to 16 units of capacity.]

A motion was made by Councilperson Neeley, seconded by Councilperson Freeman, that this matter be Adopted. The motion carried by the following vote:

Aye: 7 - Councilperson Poplar, Councilperson Freeman, Councilperson Lawler, Councilperson Neeley, Councilperson Sarginson, President Kincaid and Councilperson Croom

No: 1 - Vice President Nolden

Absent: 1 - Councilperson Weighill

130216 Approval/The First Amendment & Restated Rules Governing the Downtown Development Authority (DDA) of the City of Flint

Resolution that the City of Flint hereby approves and The First Amendment & Restated Rules Governing the Downtown Development Authority (DDA) of the City of Flint, attached hereto. [NOTE: The City of Flint created the DDA, in accordance with Public Act 197 of 1975, as amended, and approved The Rules Governing the DDA in 1977. Public Act 197 has been amended and revised at various times since then, which required the proposed changes.] [NOTE: The First Amendment & Restated Rules Governing the Downtown Development Authority (DDA) of the City of Flint is attached.]

A motion was made by Councilperson Freeman, seconded by Vice President Nolden, that this matter be Amended. The motion carried by the following vote:

Aye: 8 - Councilperson Poplar, Vice President Nolden, Councilperson Freeman, Councilperson Lawler, Councilperson Neeley, Councilperson Sarginson, President Kincaid and Councilperson Croom

Absent: 1 - Councilperson Weighill

130216.1 Amended Resolution/Approval/The First Amendment & Restated Rules Governing the Downtown Development Authority (DDA) of the City of Flint

Amended resolution that the City of Flint hereby approves and The First Amendment & Restated Rules Governing the Downtown Development Authority (DDA) of the City of Flint, attached hereto. [NOTE: The City of Flint created the DDA, in accordance with Public Act 197 of 1975, as amended, and approved The Rules Governing the DDA in 1977. Public Act 197 has been

amended and revised at various times since then, which required the proposed changes.] [NOTE: The First Amendment & Restated Rules Governing the Downtown Development Authority (DDA) of the City of Flint is attached.] [Resolution amended for changes to rules.]

A motion was made by Councilperson Freeman, seconded by Vice President Nolden, that this matter be Adopted. The motion carried by the following vote:

Aye: 8 - Councilperson Poplar, Vice President Nolden, Councilperson Freeman, Councilperson Lawler, Councilperson Neeley, Councilperson Sarginson, President Kincaid and Councilperson Croom

Absent: 1 - Councilperson Weighill

RESOLUTIONS - MAY BE REFERRED FROM S.A.

130210 Resolution/City Council/Mayor Dayne Walling/Request for Appointment of Transition Advisory Board

Resolution resolving that Mayor Dayne Walling and the Flint City Council request and recommend to Gov. Rick Snyder that a receivership transition advisory board be appointed for the City of Flint under Public Act 436 no later than July 1, 2013. [NOTE: On December 1, 2011, Gov. Snyder appointed Michael K. Brown as Emergency Manager under Public Act 4 for the City of Flint, due in part to a consistent deficit in the general fund, the decline in pooled cash, budget issues and unfunded liabilities for post-employment benefits. Due to the suspension and subsequent repeal of Public Act 4, Gov. Snyder appointed Edward J. Kurtz as Emergency Financial Manager under Public Act 72 for the City of Flint, effective August 9, 2012. Both the Emergency Manager and the subsequently appointed Emergency Financial Manager were authorized by virtue of their appointment to "act for and in the place and stead of the governing body and the office of chief administrative officer of the City of Flint." On March 28, 2013, Public Act 436 will become effective and provides that an emergency financial manager appointed and serving under state law immediately prior to the effective date shall continue to serve as an emergency manager under Public Act 436. As an alternative to continuation of an emergency manager, and if the financial emergency has been rectified, Public Act 436 authorizes the governor to appoint a receivership transition advisory board, which serves at the pleasure of the governor and monitors the affairs of the local government until the receivership is terminated.]

No vote was taken on this amendment.

Amended

130210.1 Amended Resolution/City Council/Mayor Dayne Walling/Request for Appointment of Transition Advisory Board

Amended resolution resolving that Mayor Dayne Walling and the Flint City Council request and recommend to Gov. Rick Snyder that a receivership transition advisory board be appointed for the City of Flint under Public Act 436 no later than July 1, 2013. [NOTE: On December 1, 2011, Gov. Snyder appointed Michael K. Brown as Emergency Manager under Public Act 4 for the

City of Flint, due in part to a consistent deficit in the general fund, the decline in pooled cash, budget issues and unfunded liabilities for post-employment benefits. Due to the suspension and subsequent repeal of Public Act 4, Gov. Snyder appointed Edward J. Kurtz as Emergency Financial Manager under Public Act 72 for the City of Flint, effective August 9, 2012. Both the Emergency Manager and the subsequently appointed Emergency Financial Manager were authorized by virtue of their appointment to "act for and in the place and stead of the governing body and the office of chief administrative officer of the City of Flint." On March 28, 2013, Public Act 436 will become effective and provides that an emergency financial manager appointed and serving under state law immediately prior to the effective date shall continue to serve as an emergency manager under Public Act 436. As an alternative to continuation of an emergency manager, and if the financial emergency has been rectified, Public Act 436 authorizes the governor to appoint a receivership transition advisory board, which serves at the pleasure of the governor and monitors the affairs of the local government until the receivership is terminated.] [Six-page resolution amended for changes proposed by City Council, City Clerk and Mayor Dayne Walling.]

A motion was made by Councilperson Freeman, seconded by Councilperson Poplar, that this matter be Adopted. The motion carried by the following vote:

Aye: 8 - Councilperson Poplar, Vice President Nolden, Councilperson Freeman, Councilperson Lawler, Councilperson Neeley, Councilperson Sarginson, President Kincaid and Councilperson Croom

Absent: 1 - Councilperson Weighill

MEETING SCHEDULE

ADDITIONAL COUNCIL DISCUSSION

ADJOURNMENT

Having no further business, Council President Scott Kincaid adjourned the meeting at 8:59 p.m.

Respectfully transcribed and submitted,

Janell Johnson, Administrative Secretary to City Council

EM SUBMISSION NO.: 2013EM041

PRESENTED: 3-28-13

ADOPTED: 3-29-13

BY THE EMERGENCY MANAGER:

RESOLUTION TO PURCHASE CAPACITY FROM KAREGNONDI WATER AUTHORITY

The Karegnondi Water Authority (KWA) is a governmental consortium of cities and counties in southeastern Michigan that was created to build a water pipeline that will provide water from Lake Huron to interested communities in Sanilac, Lapeer, and Genesee counties. The incorporating bodies that created the KWA are Sanilac County, Lapeer County, Genesee County, the City of Flint, and the City of Lapeer.

The City of Flint is currently in a year to year contract with the City of Detroit for the purchase of water. A study was conducted that projected that staying with Detroit will cost the region $2.1 billion over the next 25 years. In contrast, if the region builds its own pipeline, the projected costs are $1.9 billion over the same period. After the initial 25 year period, the projected costs would be less then 25% of the projected water costs from Detroit.

In order to build the pipeline, the KWA needs commitment from its members regarding the capacity that each member will purchase in the pipeline. The KWA is allowed to withdraw 85 million gallons of water per day. Capacity is available to members in increments of 1 million gallons per day known as units. For each unit of capacity that a member purchases, the buyer shall pay to the KWA a one time fee of $32,300.00. Additionally, the buyer shall pay to the KWA not less then $32,300.00 per unit per year until such time as water is made available to the buyer. After water is made available, the buyer shall pay to the KWA an estimated amount not to exceed $355.300.00 per unit per year until such time that the bonds are paid in full. If it is determined that the costs per unit will exceed $355,300.00 the buyer has a right to cancel the contract.

The purchase of capacity along with the payment of other costs necessary to operate the pipeline gives the member a right to water for sale to its customers. The buyer has a right to resell capacity and water rights. Each party entering into a capacity contract shall also be entitled to appoint additional board members equal to the party's percentage share of the total capacity under contract.

It is in the long term best interests of the City of Flint to enter into a contract with the KWA to purchase up to eighteen (18) units of capacity.

IT IS RESOLVED that City officials are authorized to enter into a contract with KWA to purchase up to eighteen (18) units of capacity.

IT IS FURTHER RESOLVED that the City Administrator is authorized to provide KWA information needed to administer the contract and, with approval of the Chief Legal Officer, to make minor (non-material) modifications to the contract.

APPROVED AS TO FORM:

Peter M. Bade, City Attorney

APPROVED AS TO FINANCE:

For **Gerald Ambrose, Finance Director**

EM DISPOSITION:

ENACT V **FAIL** _____ **DATED** 3-29-13

Edward L. Kurtz, Emergency Manager

S:\P. Bade\EM2013\Resolutions\KWA.03.28.13.doc

Flint

Flint City Council approves resolution to buy water from Karegnondi, state approval still needed



[http://connect.mlive.com/staff/dadams1/index.html] By Dominic Adams | dadams6@mlive.com [http://connect.mlive.com/staff/dadams1/posts.html]
Follow on Twitter [http://www.twitter.com/dominicadams]
on March 25, 2013 at 10:45 PM, updated March 26, 2013 at 1:28 AM

FLINT, MI – Flint is one step closer to getting its water from Lake Huron as part of the Karegnondi Water Authority.

The vote, **approved 7-1 at the Flint City Council meeting Monday, March 25 [http://www.mlive.com/news/flint/index.ssf/2013/03/flint_city_council_again_delay.html]** , may have set in motion the end to Flint paying to get its water from Detroit.

Under the proposal, Flint would get 16 million gallons per day of raw water from Lake Huron, pipe it to Flint for treatment and then sell it to customers throughout the city. Another 2 million gallons per day would come from the Flint River and will be treated in Flint.

Mayor Dayne Walling said the Department of Environmental Quality must approve Flint's getting 2 million gallons per day from the Flint River.

Tuesday's meeting followed weeks of discussions and special meetings surrounding the resolution.

"We got there," Councilman Joshua Freeman said. "That's the important thing."

There were more than 50 people at Monday's meeting.

"Going with Karegnondi is the best decision. We have no opinion on the economics of the decision," said Rebecca Fedewa, Flint River Watershed Coalition executive director. "If we start drawing water out of the Flint River, we are at risk of having to start releasing water from our reservoirs."

Genesee County Drain Commissioner Jeff Wright said the decision must still be approved by a county water and waste advisory board. The KWA board will then be reconvened for final approval.

Wright said construction could start in May.

State treasury officials still must approve the city council's move because Flint has an emergency financial manager. All expenditures over $50,000 must be approved.

Genesee County Drain Commissioner Jeff Wright has said that Flint would pay roughly $6.4 million annually for water service if it joined the pipeline – a nearly $4 million savings on what it pays Detroit for water.

Walling previously said the **city would save $19 million over eight years [http://www.mlive.com/news/flint/index.ssf/2013/03/flint_city_council_delays_deci.html]** by getting water from the KWA.

"It's a historic night in the City of Flint," Walling said. "The savings will be less with the capacity level approved by city council because there will be increased treatment cost for the river water."

He said the DEQ told the city it needed to get 18 million gallons per day or there would have to be additional work done at Flint's water plant.

Flint's water plant and the Flint River is currently the backup for Flint and Genesee County, however, the plant only operates four times per year.

Councilman Bryant Nolden was the lone dissenting vote.

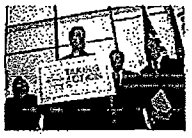
"It was a protest vote," Nolden said. "I knew they had enough votes. I just feel like the Flint River is our best option."

Karengnondi is the regional water authority that includes Genesee, Lapeer and Sanilac counties and the cities of Flint and Lapeer.

Flint is the second municipality, behind Genesee County, to officially decide to purchase raw water through the KWA. Lapeer city officials said they intend to purchase water, but an agreement has been finalized.

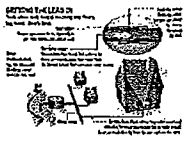
*Dominic Adams is a reporter for MLive-Flint Journal. Contact him at **dadams5@mlive.com** or 810-241-8803. Follow him on **Twitter [http://www.twitter.com/dominicadams]**, **Facebook [http://www.facebook.com/dominic.adams.1865]** or **Google+ [https://plus.google.com/103690672506808729911?rel=author]**.*

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GENESEE COUNTY DRAIN COMMISSIONER

GENESEE COUNTY DRAIN COMMISSIONER'S OFFICE

JEFFREY WRIGHT
COMMISSIONER
G-4608 BEECHER ROAD, FLINT, MI 48532
PHONE (810) 732-1590 FAX (810) 732-1474

GENESEE COUNTY DRAIN COMMISSIONER

FOR IMMEDIATE RELEASE

CONTACT: Jeff Wright

March 26, 2013

810-287-1925

What: Jeff Wright Statement on Flint City Council Approving Resolution to Join KWA.

When: March 26, 2013

Additional Info: Jeff Wright, CEO of the KWA, today praised the Flint City Council for voting to approve a resolution to officially have the City of Flint join the KWA and its' water line.

"I have said from the beginning that this decision must be made by Flint's City Council and Mayor," said Wright. "I appreciate the council voting the way they did, but even more than that, I am glad the residents of Flint were able to have their voices heard via their elected officials." The next step in the process will come with the KWA Board executing the contract for the City.

"The most important aspect from the vote is the fact that we as an Authority can move forward knowing Flint's intentions," said Wright.

Despite Emergency Manager Ed Kurtz publicly supporting the project, Wright had made a vote by council a condition of Flint joining the KWA so the residents would have their say.

"There is a basic tenet that government is best when it has local control. We saw that with the council vote. Nobody, whether they live in Flint, Grand Blanc, Davison, Fenton, or anywhere in Genesee County, should have these types of decisions made by people who live outside of their community," said Wright.

At the next Water and Waste Advisory Board meeting a vote will be taken to award a contract for construction of the intake portion of the water line. All bids were submitted to the board at their last meeting for review.

89 (Rev. 02-11)

STATE OF MICHIGAN
DEPARTMENT OF TREASURY
LANSING

RICK SNYDER
GOVERNOR

ANDY DILLON
STATE TREASURER

April 11, 2013

Mr. Edward Kurtz
Emergency Manager
City of Flint
1101 South Saginaw Street
Flint, MI 48502

Dear Mr. Kurtz:

Thank you for your March 29, 2013 letter, which is attached for reference. As the Emergency Manager for the City of Flint ("Flint" or "City"), you have asked for my concurrence, pursuant to Public Act 436 of 2012, the Local Financial Stability and Choice Act, to authorize a contract in excess of $50,000.00 not subject to competitive bidding. This request was related to the City entering into an agreement with the Karegnondi Water Authority (KWA) for provision of raw water for the City.

In considering your request, I took note of the following facts in support of Flint joining KWA. First, there is widespread support in the City for this move, including the support of the Mayor, the City Council, and the Emergency Manager. Second, this move will provide a unique opportunity for the City and County to partner on an important project, which will hopefully lead to future regional collaboration. Third, the Department of Environmental Quality is supportive of the City participating in the KWA project. Finally, your representations that this deal will lead to substantial savings for the City over the coming decades, savings that are desperately needed to help with the turnaround of the City of Flint.

It is my understanding that the Detroit Water and Sewer Department is making a final best offer to Genesee County and the City of Flint next Monday, April 15, 2013. As such, this approval will be effective at 5 pm on April 16, 2013 after receiving written notice from the City that either no such offer was presented to the county and the City or that an offer was received and was rejected in good faith based upon specified objections.

For the reasons described above and subject to the conditions set forth herein, pursuant to Section 12 (3) of PA 436 of 2012, I am authorizing you to proceed with adopting the resolution and entering into a contract with KWA.

Sincerely,

Andy Dillon
State Treasurer

Flint

Flint council supports buying water from Lake Huron through KWA

[http://connect.mlive.com/staff/dadams1/index.html] By Dominic Adams | dadams5@mlive.com [http://connect.mlive.com/staff/dadams1/posts.html]
Follow on Twitter [http://www.twitter.com/dominicadams]
on March 25, 2013 at 7:17 PM, updated March 26, 2013 at 7:43 AM

FLINT, MI -- Flint residents may soon get their water from Lake Huron.

The Flint City Council voted 7-1 to get 16 million gallons per day from the Karegnondi Water Authority.

"This is about compromise," said Councilman Sheldon Neeley.

Neeley got support from Councilman Joshua Freeman, after the two were previously at odds about the amount the city should withdraw from Lake Huron.

Councilman Bryant Nolden was the lone "no" vote.

"It was a protest vote," Nolden said. "I just feel like the Flint River is our best option."

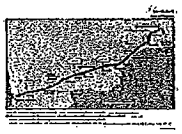
Genesee County Drain Commissioner said construction of the pipeline could start in May.

The city currently pays to get its water from Detroit.

State treasury officials still must approve the city council's move because Flint has an emergency financial manager. All expenditures over $50,000 must be approved.

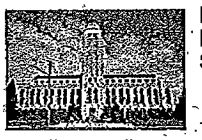
*Dominic Adams is a reporter for MLive-Flint Journal. Contact him at **dadams5@mlive.com** or 810-241-8803. Follow him on **Twitter [http://www.twitter.com/dominicadams]** , **Facebook [http://www.facebook.com/dominic.adams.1865]** or **Google+ [https://plus.google.com/103690672506808729911?rel=author]** .*

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Resolution: 130165.2

Presented: 3-11-13

Adopted: 3-25-13

AMENDED RESOLUTION TO PURCHASE CAPACITY FROM KAREGNONDI WATER AUTHORITY

BY THE MAYOR:

The Karegnondi Water Authority (KWA) is a governmental consortium of cities and counties in southeastern Michigan that was created to build a water pipeline that will provide water from Lake Huron to interested communities in Sanilac, Lapeer, and Genesee counties. The incorporating bodies that created the KWA are Sanilac County, Lapeer County, Genesee County, the City of Flint, and the City of Lapeer.

The City of Flint is currently in a year to year contract with the City of Detroit for the purchase of water. A study was conducted that projected that staying with Detroit will cost the region $2.1 billion over the next 25 years. In contrast, if the region builds its own pipeline, the projected costs are $1.9 billion over the same period. After the initial 25 year period, the projected costs would be less then 25% of the projected water costs from Detroit.

In order to build the pipeline, the KWA needs commitment from its members regarding the capacity that each member will purchase in the pipeline. The KWA is allowed to withdraw 85 million gallons of water per day. Capacity is available to members in increments of 1 million gallons per day known as units. For each unit of capacity that a member purchases, the buyer shall pay to the KWA a one time fee of $32,300.00. Additionally, the buyer shall pay to the KWA not less then $32,300.00 per unit per year until such time as water is made available to the buyer. After water is made available, the buyer shall pay to the KWA an estimated amount not to exceed $355,300.00 per unit per year until such time that the bonds are paid in full. If it is determined that the costs per unit will exceed $355,300.00 the buyer has a right to cancel the contract.

The purchase of capacity along with the payment of other costs necessary to operate the pipeline gives the member a right to water for sale to its customers. The buyer has a right to resell capacity and water rights. Each party entering into a capacity contract shall also be entitled to appoint additional board members equal to the party's percentage share of the total capacity under contract.

The City of Flint has decided that it is in its long term best interests to enter into a contract with the KWA to purchase SIXTEEN (16) units of capacity, plus TWO (2) units from the Flint River.

IT IS RESOLVED that City officials are authorized to enter into a contract with KWA to purchase SIXTEEN (16) units of capacity, plus TWO (2) units from the Flint River.

IT IS FURTHER RESOLVED that the City Administrator is authorized to provide KWA information needed to administer the contract and, with approval of the Chief Legal Officer, to make minor (non-material) modifications to the contract.

APPROVED AS TO FORM:

Peter M. Bade
Chief Legal Officer

APPROVED AS TO FINANCE:

Gerald Ambrose
Finance Director

APPROVED BY MAYOR:

Dayne Walling
Mayor

APPROVED BY CITY COUNCIL
ON: March 25, 2013

Inez Brown
Clerk, City of Flint

APPROVED BY
CITY COUNCIL
MAR 25 2013

S:\JP\Ordinances and Resos\KWA.03.08.13.doc

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
Pre-1967	Flint Water Treatment Plant in operation using Flint River for drinking water	1
Post-1967	Flint switched to Detroit Water and Sewerage Department for drinking water	None
January 2006	Discussions regarding Karegnondi Water Authority, *Preliminary Long-Term Water Supply for Genesee County*	2
June 25, 2009 September 2009	*Lake Huron Water Supply Study* *Karegnondi Water Authority* Executive Summary and Preliminary Engineering Report	3
March 2013	*Analysis of the Flint River as a Permanent Water Supply for the City of Flint*; Prepared for: City of Flint dated July 2011	4
April 2013	Flint notifies Detroit Water and Sewerage Department of contract discontinuation and joins the Karegnondi Water Authority	5
April 2013	Detroit Water and Sewerage Department sets termination of Flint water service contract to April 17, 2014	6
June 2013	Flint notifies the Department of Environmental Quality of intent to operate Flint Water Treatment Plant full time using Flint River for drinking water	7
April 2014	The Michigan Department of Environmental Quality issues Flint Water Treatment Plant construction permits for full time operation enhancements	9
May 2014	Flint stops purchasing Detroit Water and Sewerage Department water. Starts using the City of Flint Water Treatment Plant and Flint River for drinking water	10
August 2014	Flint *E. coli* bacteria violation, localized system Boil Water Advisory	11
September 2014	Disinfection Byproducts compliance communication; the Michigan Department of Environmental Quality requests preemptive Operational Evaluation	12
September 2014	Flint total coliform bacteria violation, localized system Boil Water Advisory	13

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
October 2014	General Motors announces decision to stop using Flint River as source for production water	14
December 16, 2014	Disinfection Byproducts quarterly violation begins	15
December 31, 2014	1st 6-month round of lead and copper monitoring ends. Results due from Flint to Michigan Department of Environmental Quality on January 10, 2015	None
January 21, 2015	City of Flint Public Meeting regarding disinfection byproducts and bacteria	17
February 26, 2015	E-mail from United States Environmental Protection Agency to Michigan Department of Environmental Quality regarding elevated lead sample	18
February 27, 2015	E-mail from United States Environmental Protection Agency to Michigan Department of Environmental Quality inquiring about Optimized Corrosion Control Treatment	19
February 27, 2015	Michigan Department of Environmental Quality response to United States Environmental Protection Agency email with statement regarding optimized corrosion control program	20
March 5, 2015	2nd Disinfection Byproducts quarterly violation notice	21
March 30, 2015	Michigan Department of Environmental Quality notifies Flint of Lead/Copper Monitoring Results.	16
April 3, 2015	Long Term 2 Enhanced Surface Water Treatment Rule Letter	22
April 6, 2015	Flint proposes installation of Granular Activated Carbon Filter media to reduce disinfection byproducts	23
April 23, 2015	United States Environmental Protection Agency e-mail to Michigan Department of Environmental Quality regarding corrosion control treatment	24
April 24, 2015 May 1, 2015	Michigan Department of Environmental Quality responds to United States Environmental Protection Agency regarding corrosion control treatment	25

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
April 27, 2015	United States Environmental Protection Agency provided bottles to 212 Browning for lead/copper analyses	26
May 6, 2015	Lead service line replaced at 212 Browning. United States Environmental Protection Agency on-site	27
May 28, 2015	Internal United States Environmental Protection Agency e-mail regarding results at 212 Browning	29
June 9, 2015	3rd Disinfection Byproducts quarterly violation notice	30
June 10, 2015	Semi-Annual Conference call with United States Environmental Protection Agency	31
June 30, 2015	E-mail from United States Environmental Protection Agency scheduling conference call on July 21, 2015 regarding elevated lead result and concerns regarding corrosion control	32
June 30, 2015	2nd 6-month round of lead and copper monitoring ends. Results due from Flint to Michigan Department of Environmental Quality on July 10, 2015	None
July 9, 2015	Michigan Department of Environmental Quality informed that United States Environmental Protection Agency draft internal memo is on ACLU website	33
July 14, 2015	Michigan Department of Environmental Quality issues construction permit to Flint for Granular Activated Carbon filter media W151055	34
July 21, 2015	Conference call with United States Environmental Protection Agency (Lead and Copper Rule implementation and Flint) during which it informs Michigan Department of Environmental Quality its interpretation of Lead and Copper Rule	35
July 24, 2015	Michigan Department of Environmental Quality e-mail and draft letter 90th percentile lead determination = 11 parts per billion and City of Flint requirement to add corrosion control treatment	36

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
July 28, 2015	Michigan Department of Environmental Quality received blood lead level information from Michigan Department of Health and Human Services indicating that results since the switch to the Flint River are consistent with past years seasonal variations	37
August 4, 2015	Meeting with city representatives at Governor's office	38
August 17, 2015	Michigan Department of Environmental Quality notifies Flint of lead/copper monitoring results and requires City to install corrosion control treatment	39
August 23, 2015	Michigan Department of Environmental Quality notified by an external party that a water quality study was about to begin in Flint	40
September 2, 2015	Disinfection Byproducts return to compliance	43
September 11, 2015	United States Environmental Protection Agency e-mail confirming that Michigan Department of Environmental Quality was never sent the draft June 24, 2015 memo	44
September 21, 2015	Meeting with Congressional representatives, legislators, United States Environmental Protection Agency and Michigan Department of Environmental Quality to discuss issues with water quality in Flint	45
September 22, 2015	Meeting/Conference call with Michigan Department of Health and Human Services, Genesee County Health Department, and Michigan Department of Environmental Quality to discuss lead education/outreach	46
September 24, 2015	Hurley Children's Hospital data reveals elevated blood lead levels in Flint children	47
September 24, 2015	Michigan Department of Health and Human Services response affirms State blood lead level data is more comprehensive than Hurley Hospital data	None

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
September 25, 2015	Flint issues Lead Advisory regarding drinking water	48
October 1, 2015	State Chief Medical Officer confirms Hurley blood lead level data	None
October 1, 2015	Genesee County Health Department issues "Do Not Drink" Advisory	49
October 2, 2015	Michigan Department of Environmental Quality and Michigan Department of Health and Human Services press conference. Governor's Flint Action Plan announced.	50
October 2, 2015	Genesee County Health Department school screening water samples collected for lead analysis	51
October 8, 2015	Governor Press Conference: Flint to reconnect to Great Lakes Water Authority/Detroit Water and Sewerage Department	52
October 15, 2015	State Legislature authorizes a $9 million to assist the City of Flint to pay for the return to the Detroit water system and to fund staff at schools to gauge lead exposure	None
October 16, 2015	First weekly coordination meeting held between the City of Flint and state agencies	None
October 16, 2015	Michigan Department of Environmental Quality meets with Flint Schools Superintendent and Genesee County Health Department	None
October 16, 2015	Flint switches back to Detroit Water and Sewerage Department for water	53
October 21, 2015	Governor Snyder announces formation of Flint Water Task Force to complete an After Action Review	None
October 28, 2015	Michigan Department of Environmental Quality issues construction permit for additional corrosion control treatment	54
October 30, 2015	Michigan Department of Environmental Quality letter to Flint regarding corrosion control treatment operation	55

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
November 3, 2015	United States Environmental Protection Agency Memorandum regarding "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems"	56
November 4, 2015	United States Environmental Protection Agency Memorandum regarding "Transmittal of Final Report – High Lead at Three Residences in Flint, Michigan"	57
Mid-Late 2016	Planned connection to Karegnondi Water Authority (Lake Huron water to Flint Water Treatment Plant)	None

FAQs for Media Q&As

Switch to Great Lakes Water Authority

What finally pushed the state to this decision?

This was the City's request, and the Governor supports it, based on several key factors:
In the near term, DWSD water will be easier to manage. It comes from a more stable source than the river, it is fully optimized for corrosion control, and it is clear that residents of Flint have more confidence in this water source.

Will this solve Flint's water crisis?

In combination with the other short term, intermediate term and long-term steps outlined last week, this move represents a big step forward. Flint still has serious system maintenance challenges it must address.

If you're saying residents will still have lead because of their plumbing, does that mean every other city in this state has a lead problem?

Many areas of the state have lead in their infrastructure mix.

Where's the state getting the money to fund this?

We have submitted a formal request to lawmakers via the appropriations process.

Where's the city getting the money to fund this?

The city is contributing all it can, and is getting assistance for its match from the Mott Foundation.

How long will the switch take?

The switch will be completed by the City and Great lakes Water Authority, but our understanding is that it can be accomplished in the very near term once the arrangements are complete.

How long will it take before Detroit's corrosion controls provide protection for Flint?

It will take some time for the corrosion control additives to build on pipe walls throughout the system. Estimates vary. The state can assure we will commence monitoring of the system early 2016 and report results as we get them to keep the community updated.

Why do residents still need to use filters and bottled water?

The filters and bottled water are responsible precautions for any resident concerned about lead exposure.

Do the filters actually work? We've been hearing they don't protect for lead.

Yes, the filters work. They are all certified for lead removal by the National Sanitation Foundation.

The filters are only good for 100 gallons. What happens when they are used up?

They will need to be replaced. And residents can get a new filter.

What about restaurants?

What's going to be done about lead service lines?

Long term, this is the only permanent solution to lead exposure. The state has committed to helping the city accomplish this goal long term.

Do you wish you'd made this switch sooner?
We support the City's decision. We can't look backward. We feel the state has responded quickly and effectively as information has surfaced, been investigated and verified. While the City of Flint is, right now, in compliance with the federal Lead and
Copper Rule, we recognize there is a disparity between surveillance testing and other testing happening in the community that we need to better understand and we are working on developing our knowledge.

Schools testing

What do these results say?
The results say we need to further investigate Flint schools and help the schools find clearer causes for some the results we got.

Any theories about what's going on?
It is possible there are specific points in the plumbing that have lead components which need to be replaced, but we can't say anything definitively until we perform an investigation at each school.

Do the schools have lead service lines? If not, why are they getting such high results?
The schools we tested initially do not have lead service lines. There are a few possible reasons why lead is being detected at specific points in the buildings and not others. When we know things definitively, we will make the information public.

How long do the schools have to stay on bottled water? Just until the switch to Detroit, or longer term?
We are encouraging the schools to continue their current protective measures as a precaution until we can get into the buildings and get more answers.

Why did you only test 13 schools?
That was what the Flint Public Schools requested.

What happens to other schools?
We will test all the schools in Flint if they request it.

What about the schools that can't afford to update their entire plumbing systems?
This is why we are having plumbing assessments completed. There is no way to know yet what each building will require.

How confident are you in your testing? You've got results all over the map.
We are confident that our testing meets the requirements for the federal Lead and Copper Rule, which is surveillance monitoring. The bigger question is whether surveillance monitoring meets the public health protection standards that Lead Exposure Testing methods do. The EPA is working on that question now, and we are engaged in that dialogue.

What do you mean by "health exposure testing"? What are you doing next?

The 90th percentile of your results is still below 15 ppb. Does that make you more or less confident in your testing and in your protocols?

It makes us confident that the testing protocol delivers consistent results. But again, it does raise questions about whether this testing method shows what people think it does or what they really want to know, which is actual lead exposure from lead plumbing in a home.

Any idea how long kids have been exposed to lead? Was it before the move to the Flint River?
That is possible. We don't know.

How does the state bring this new information into the broader picture of kids' lead exposure across the state?

Flint water key date timeline and background information

DRAFT-INTERNAL DOCUMENT

Prepared Jan. 10, 2016

This is a list of the major developments concerning Flint water. Sources: Department of Health and Human Services, Department of Environmental Quality, Office of the Auditor General, media reports, Communications Department releases, Office of Urban Initiatives.

2006

January: Discussions regarding Karegnondi Water Authority start. (DEQ)

2013

March: Flint City Council votes 7-1 to join the Karengondi Water Authority. (OAG)

April 16: City of Flint Emergency Manager Ed Kurtz signs agreement to switch from Detroit Water and Sewerage Department water source to KWA. (OAG) DWSD sets termination of Flint water service for April 17, 2014. (DEQ)

April 17: DWSD said it will stop selling water to the City of Flint in April 2014. (OAG)

June: Flint notifies the DEQ of intent to operate the Flint Water Treatment Plant full-time using Flint River for drinking water. (DEQ)

2014

Mid-March: City of Flint decides to use the Flint River as a water source. (OAG)

April: DEQ issues Flint Water Treatment Plant construction permits for full-time operation enhancements. (DEQ)

April 25: City of Flint switches to Flint River water. (OAG)

July: DEQ begins the first six-month Flint lead-copper monitoring report. (OAG)

October: General Motors announces decision to stop using Flint River as source for production water. (DEQ)

2015

January 1: DEQ begins second six-month Flint lead/copper monitoring period. (OAG)

January 12: DWSD offers the City of Flint a waiver of the $4 million reconnection fee to switch back to Detroit water. (OAG)

January 29: City of Flint Emergency Manager Jerry Ambrose declines DWSD water source reconnection. (OAG)

February 3: Gov. Snyder awards the City of Flint $2 million to find leaks and replace wastewater incinerator. (OAG)

February 26: The EPA discusses a resident's water sample testing results with the DEQ. High levels of lead were found in the water. (OAG)

February 26: Flint resident LeAnn Walters contacts Childhood Lead Poisoning Prevention Program, expressing concern about Flint water quality and provider refusing to test her children. On March 3, Ms. Walters contacted CLPPP because child had elevated blood lead level; said city officials wouldn't talk to her about her water; DHHS staff provided EPA contact information. (DHHS)

February 27: DEQ responded to the EPA saying that the Flint Water Treatment Plant has an optimized corrosion control program. (OAG)

March 30: DEQ notifies the Flint WTP of the first six-month lead/copper monitoring period. (OAG)

April 6: Flint proposes installation of Granular Activated Carbon Filter media to reduce disinfection byproducts. (DEQ)

April 24: DEQ indicates no corrosion chemical (orthophosphate) in place. (OAG) ✗ VERIFY, WHERE. DID WE GET THIS FROM

May 28: Sample results from the residence noted with high lead levels on Feb. 26 show lead levels improved after a new copper service line installation. (OAG)

July 13: Leaked internal EPA memo signals concerns about lead in Flint water. DEQ spokesman Brad Wurfel says "Let me start here – anyone who is concerned about lead in the drinking water in Flint can relax."

July 21: The EPA and DEQ hold a conference call on DEQ's implementation of the Lead and Copper Rule and Flint issues. (OAG)

July 22: Contact from Mark Johnson U.S. Agency for Toxic Substances and Disease Registry to Linda Dykema, head of the Division of Environmental Health, regarding Flint drinking water status; asking if Environmental Health was engaged. (DHHS)

July 22: Dennis Muchmore email to DHHS Director Lyon stating community concerns about lead in the water: "I'm frustrated by the water issue in Flint. I really don't think people are getting the benefit of the doubt. Now they are concerned and rightfully so about the lead level studies they are receiving from the DEQ samples. These folks are scared and worried about the health impacts and they are basically getting blown off by us."

Excerpt of July 28 response from Childhood Lead Poisoning Prevention program head (Emphasis added):

"We compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –

- Lead testing rates remained about the same from year to year (chart on the right).
- There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).
- However that pattern was not terribly different from what we saw in the previous three years, especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).
- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows

more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspect that the summer data spike may be related to this effect.

* If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015.

"So upon review, we don't believe our data demonstrates an increase in lead poisoning rates that might be attributable to the change in water source for Flint. We recognize that lead exposure via the water is only a small piece of what may be happening for families in Flint, however, we hope the information is helpful."

July 24: DHHS Division of Environmental Health contacts DEQ for update on drinking water testing/status. S. Busch relates that city in compliance with lead copper rule; one house with high lead level in water was an anomaly as house was connected to old water main but had since been corrected. This home was the residence of LeAnne Walters. (DHHS)

August 4: Meeting with Governor's Office and Flint pastors. Flint pastors had information provided to Director Lyon in response to Dennis Muchmore's inquiry (DHHS)

August 17: DEQ notifies the Flint WTP of the second six-month lead/copper monitoring results. (OAG)

August 23: Virginia Tech researcher notifies the DEQ that he will begin a study of the City of Flint water quality. (OAG)

August 24: Dr. Mona Hanna Attisha contacts Genesee County Health Department for blood lead level data/information. (DHHS)

August 28: Concerned Pastors announce water filter giveaway in Flint. (Mlive)

September 2: Virginia Tech researcher claims that the corrosiveness of the Flint water is causing lead to leach into the residents' water. (OAG)

September 24: Hurley Medical Center study issued showing high blood lead levels in City of Flint Children. (OAG)

September 24: DHHS responds to Hurley, saying state blood lead level data is more comprehensive than Hurley data. (DEQ)

September 25: Flint issues lead advisory regarding drinking water (DEQ)

September 29: Dr. Eden Wells contacts Dr. Mona Hanna Attisha regarding her study results. (DHHS)

September 30: Briefing to Director Lyon comparing Lead Copper Rule Testing and Marc Edwards protocol. (DHHS)

October 1: Michigan Department of Health and Human Services confirms results of Hurley Medical Center Study. (OAG)

October 1: MDHHS provides information for Flint Water website, including the following documents: Parent Handbook: Is Your Child Safe From Lead Poisoning, Blood Lead Level Quick Reference for Primary Care Providers, Lead Screening & Testing for Safe, Healthy Michigan Kids, and finally, Pregnant and Nursing Mothers: What You Need to Know. (DHHS)

October 1: City of Flint, Genesee County Health Department urge residents to not drink water. (OAG, DEQ)

October 2: MDHHS determines its study results are now consistent with Hurley findings, Gov. Snyder announces comprehensive action plan to address Flint water issues. State Budget Office approval to use carryover emergency funds and transfer of DEQ funds to purchase water filters. (DHHS)

October 2: Press conference in Flint to announce action plan, led by Harvey Hollins, Dan Wyant, Dr. Eden Wells and Nick Lyon.

October 2: Genesee County Health Department school screening water samples collected for analysis. (DEQ)

October 5: MDHHS announces water filters will be available to the public on Oct. 6. (DHHS)

October 7: Flint Technical Advisory Board meets, recommends reconnection to Detroit water.

October 8: Gov. Snyder conducts press conference in Flint, announces plan to reconnect to Detroit water.

October 8: City of Flint develops plan to reconnect to DWSD. (OAG)

October 15: Gov. Snyder signs bill authorizing funding for Flint to move back to Detroit water system.

October 16: City of Flint reconnects to DWSD. (OAG)

October 19: DEQ Director Dan Wyant states: "Staff made a mistake while working with the City of Flint. Simply stated, staff employed a federal (corrosion control) protocol they believed was appropriate and it was not." (OAG)

October 21: Gov. Snyder announces Flint Water Task Force to review state, federal and municipal actions, offer recommendations.

October 28: DEQ issues construction permit for additional corrosion control treatment. (DEQ)

November 3: The EPA indicates differing possible interpretations of the Lead and Copper Rule with respect to how the LCR's optimal corrosion control treatment procedures apply to this situation (new water source/new water treatment). (OAG)

December 29: Gov. Snyder takes action on initial findings from Flint Water Task Force, DEQ Director Wyant and Communications Director Brad Wurfel resign.

December 30: Gov. Snyder taps DNR Director Keith Creagh to guide DEQ through leadership transition.

2016

January 4: Genesee County Commission votes for emergency declaration

January 5: Gov. Snyder declares emergency for Genesee County

January 8: Gov. Snyder and Flint Mayor Weaver meet to discuss how city and state can work on water issues.

January 9: MSP Emergency Management Division announces water resource sites established in Flint with bottled water, filters and testing kits

January 10: In the last day we connected with about 7,000 people via automated telephone calls, 4,300 via email, and are working on a direct mail card that will go to 60,000 households in Flint. We have created a palm card for door to door and for every resource and community center, and will have a Spanish version on January 11.

Additional Information

Corrosion Control (From DEQ)

- On October 16, 2015 Flint returned to using water supplied by DWSD. The water supplied by DWSD is a finished product ready to use and already has phosphate added to it to assist with corrosion control.
- Recognizing that the level of phosphate in the water from DWSD was designed to be a maintenance dosage, the DEQ and the Flint worked together to bring online supplemental phosphate addition so as to speed up the rebuilding of the protective layer in the distribution system.
- On October 28, 2015 the MDEQ issued a construction permit to Flint for the supplemental corrosion controls.
- Flint worked diligently to order and install the necessary equipment and on December 9, 2015 the city began supplemental corrosion controls.
- The DEQ is now partnering with Flint, the U.S. EPA and other governmental entities to proactively identify bottlenecks so that the eventual switch from DWSD to the KWA can be done smoothly and with safety being the top priority.
- It is important to note that the water that will be coming from the KWA will have very similar background characteristics as the water currently coming from DWSD.
- Even with these similarities, precautionary measures are being taken.
    - These measures will include running the Flint Water Treatment Plant on a trial basis for a period of time without sending the water into the distribution system so that all of the treatment processes can be thoroughly evaluated.
    - In addition, bench top testing will be conducted to assist in determining how the Water Treatment Plant processes can be optimized.

- The KWA will be supplying raw water. This water will need to be treated by each of the respective water supplies.

- When KWA comes on line, Flint will be receiving raw water that is similar to the raw water that DWSD treats.
    - Flint will then need to operate the water treatment plant for an (as of yet) undetermined period of time.
    - Once Flint has demonstrated that it is capable of generating water with the desired background characteristics it will then be able to then send water to the distribution system.

- There are some logistical issues that need to be worked out such as the connections between the city and the county.

Water Testing Update (From DEQ)

- More than 700 samples have been tested through the free water testing being offered to the residents of the city of Flint.

- Additional distribution points have been brought online to make it even easier for residents to have their water tested.

- While many of the results are encouraging, all residents, even those with results showing low to undetectable amounts of lead should continue the use of filtration devices until further notice.

- The data that is being collected is very useful in helping to identify overall trends and potential hot spots.

School Testing (From DEQ)

- To date 13 of the facilities in the Flint Community schools system have had a plumbing evaluation conducted to identify issues in the plumbing systems.

- This is very extensive testing that is being done in conjunction between the DEQ, DLARA, DHHS, the Flint Community Schools System as well as other partners.

- To give an indication of just how extensive this testing is, over 2500 samples have been taken at the 13 facilities.
    - Freeman Elementary
    - Eisenhower Elementary
    - Brownell K-2 STEM Academy
    - Doyle Ryder Elementary
    - Pierce Elementary
    - Central Kitchen
    - Durant-Tuuri-Mott Elementary

- Neithercut Elementary
- Potter Elementary
- Holmes 3-6 STEM Academy
- Southwestern Classical Academy
- Northwestern High School/ALA
- Administration Building

- The data collected so far shows that the issues are mainly fixture related.
  - Fountain heads and faucets as well as the adjoining valves and other brass components appear to be the largest contributors of lead in the plumbing in the schools.
  - This is good news in that these issues are easier to fix than if the issues were deeper in the plumbing.

- There are an additional 12 schools and child care facilities that are on a list to be evaluated.
  - We are aggressively working to identify the larger universe of schools and child care facilities serviced by the city of Flint so they can receive a free plumbing evaluation.

Blood-level testing data and filter distribution (From DHHS)

- The DHHS team is completing another data pull On Monday, January 11, so there will be an update on blood lead level tests this week.
  - The most recent report includes total numbers by year going back to 2010, and then numbers from Oct. 1 2015 through Dec. 18 2015.
  - The numbers are not broken down by month – that's not how DHHS has completed data pulls to date. We could get the number of tests completed by month sometime tomorrow.

- Blood lead level test results for Flint ZIP codes 48501-48507:
  - Tests completed Oct. 1 to Dec. 18
    - Age 0 to 6 = 989
    - 6 to 17 = 602
    - 18 + = 591
    - Total Tests Completed = 2,182

  - Elevated Blood Lead Levels Oct. 1 to Dec. 18
    - Age 0 to 6 = 23
    - 6 to 17 = 7
    - 18 + = 13

- Total Elevated Blood Lead Levels = 43

- The Blood Lead Level Testing Summary Report for prior years.

- Month by month filter distribution is unavailable.

- The most recent number of state-provided filters is 12,386 from Oct. 1 through Jan. 8.

- We know that does not capture total distribution – forms are manually entered into a database and those entries are not up to date.
- Also distributed so far are 1,985 replacement filters, 354 filter pitchers and 2,500 lead testing kits.
- Capt. Kelenske is addressing the issue to ensure the database is brought current.
- Nine churches received 2,000 filters and 2,000 cartridges (total, not each) to share on Sunday for distribution. They also received bottled water.

Church and community involvement (From Harvey Hollins)

- We're unable to get accurate information on the amount of water and filters distributed by community groups because there hasn't been a coordinated effort.

- There are anecdotal reports that the United Way and UAW has worked to distribute water and that Coca-Cola provided two truckloads filled with water to the Genesee County Food Bank that was distributed, in part, through the churches.

- We've worked with the Concerned Pastors group, especially with the summer distribution of 1,500 filters purchased through the corporate donor.

Thelen, Mary Beth (DEQ)

From: Shekter Smith, Liane (DEQ)
Sent: Wednesday, October 07, 2015 6:51 PM
To: Shaler, Karen (DEQ)
Cc: Pallone, Maggie (DEQ); Krisztian, George (DEQ); Thelen, Mary Beth (DEQ); Busch, Stephen (DEQ); Benzie, Richard (DEQ); Devereaux, Tracy Jo (DEQ); Dykema, Linda D. (DHHS)
Subject: RE: DRAFT Summary Protocol Document
Attachments: DRAFT Recommended Screening Strategies for Assessing and Reducing Lead in Drinking Water in Schools.docx

With the attachment....

From: Shekter Smith, Liane (DEQ)
Sent: Wednesday, October 07, 2015 6:50 PM
To: Shaler, Karen (DEQ)
Cc: Pallone, Maggie (DEQ); Krisztian, George (DEQ); Thelen, Mary Beth (DEQ); Busch, Stephen (DEQ); Benzie, Richard (DEQ); Devereaux, Tracy Jo (DEQ); Dykema, Linda D. (DHHS)
Subject: DRAFT Summary Protocol Document

For the Director. Not for inclusion in the Governor's package.

Strategy for Assessing and Reducing Lead in Drinking Water in Schools

Summary

Objective: To determine the levels of lead (Pb) at cooking and drinking water outlets within schools served by the city of Flint municipal water supply.

Action Steps:

- Develop a Sampling Plan

  Detailed instructions will be provided to each school regarding actions to be taken the day prior to sampling and the day of sampling.

  Each tap/outlet used for cooking or drinking water will be sampled.

  Samples will be collected at prescribed intervals to determine whether (1) an outlet is a source of lead, (2) the supply pipe is a source of lead, (3) brief flushing may provide reduced lead levels. Other samples, as necessary, to identify a unique concern identified by the plumbing assessment.

  All samples will be analyzed by the MDEQ certified drinking water laboratory.

- Develop a Plumbing Profile

  By identifying what materials are used in facility plumbing, and where they are located, it is possible to determine where monitoring and what sampling regimen will be effective in analyzing water likely to contain lead.

  A plumbing assessment will assist in determining how the potable water piping flows in the building and the order in which samples will be collected.

- Evaluate the Analytical Results

  The analytical results will be evaluated and compared to the 15 ppb Pb action level benchmark established by U.S. EPA in the federal lead and copper rule in the Safe Drinking Water Act.

- Action in Response to Findings

  Any tap/outlet with lead levels that exceed 15 ppb may be resampled, removed from service, or other measure(s) taken. Short term and more permanent measures/controls will be identified.

- Follow-up Sampling

  Follow-up sampling may be necessary to ensure that any site specific measures/controls have been effective.

- Communication

  An effective communications strategy is critical to explain potential risks, describe technical solutions and build trust among parents, school and local health department officials, and the water supplier. Public health agencies will provide information to assist schools with their communications.

Development of this summary protocol is based on U.S. EPA technical guidance entitled "3Ts for Reducing Lead in Drinking Water in Schools (EPA 816-B-05-008)", the American Water Works Association guidance "Assisting Schools and Child Care Facilities in Addressing Lead in Drinking Water" and other state and local health department school lead sampling and assessment guidance.

PLAN FOR INITIAL OUTREACH VISIT TO RESIDENTS WITH LEAD LEVELS IN EXCESS OF 150 ug/l (ppb)

GOAL: To conduct initial outreach visit to every residence within the Flint Water Emergency footprint within 48 hours of receipt of laboratory data that indicates water sample levels in excess of 150 ppb.

PLAN:

1. Deploy one Initial Outreach Team on February 4, 2016 to homes with lead levels in water samples greater than 150 ppb to provide safe drinking water commodities (e.g. bottled water, filters, replacement cartridges, and sample kits) and information packets (attached). The Initial Outreach Team will also offer to schedule a follow up appointment for additional services that will be provided by the High Lead Response Task Force. The Initial Outreach Team consists of one Department of Environmental Quality representative, two Team Rubicon representatives, one Penske truck loaded with commodities, and one uniform police in escort vehicle. Goal is to visit every address within the Flint Water Emergency footprint with lead levels in water greater than 150 ppb on February 4, 2016.

2. Going forward, after all addresses in Task 1 have been visited, the Initial Outreach Team will visit every address within the Flint Water Emergency footprint within 48 hours of receipt of laboratory data that indicates lead levels in water greater than 150 ppb.

3. After all addresses with lead levels in water greater than 150 ppb have been visited, the Initial Outreach Team will visit addresses immediately adjacent to those with lead levels in water greater than 150 ppb and offer to leave test kits for water sample collection.

4. The High Lead Response Task Force will conduct follow up appointments scheduled through, or as a result of, the Initial Outreach Team visits. Their mission is to collect water samples; inspect plumbing, fixtures, clean

aerators, and flush hot water heaters as needed; and provide health consultation services. The High Lead Response Task Force will consist of one Department of Environmental Quality representative, one Department of Health and Human Services representative (or equivalent), one licensed plumber, and one law enforcement escort.

5. Data will be recorded by both the Initial Outreach Team and High Lead Response Task Force using an iPad and program that will record geospatial data that can be uploaded into Geographic Information System (GIS).

6. Residences with high lead levels in water samples will be asked if they will participate in the sentinel sampling program.

17

DEQ's 19 Point Partnering Plan

~~DEQ's 19 Point Flint Action Plan~~

1. After Action Plan (FAQ) will be ready by noon 11/16/15
   FIRST VERSION COMPLETE UPDATED AS NEEDED

2. School Test Data
   a. ~~Reports not held~~ SCHOOL REPORTS TO BE EXPEDITED
   b. Steve reports STEVE BUSCH CREATES SUMMARY REPORTS
   c. George spreadsheet
      GEORGE KRISTIAN CREATE SUMMARY SPREADSHEETS

3. Blood exposure-~~Dan to speak with Nick~~
   DHHS IS LEAD ON PROVIDING DATA

4. Meeting with Mayor KAREN WEAVER
   Harvey Hollins lead; Dan, Jim and George to attend
   ADD LAST NAMES

5. Messaging ~~moving forward~~ ~~over~~
   OUR PARTNERING PLAN
   - PROVIDING ONGOING PUBLIC UPDATES TO GOVERNORS 10 POINT PLAN
   - CONTINUE EMPHASIS ON THE AVAILABILITY OF FREE TESTING TO RESIDENTS, SAMPLING

6. Sampling Protocol
   a. Establish ~~Relationship~~ with EPA Region 5-~~General Agreement~~ on Protocol
      alignment

7. Lead service line replacement
   a. RLF directed at lead service line replacement
   b. Amy Epkey, Maggie, Sonya
   EXPAND
   LAST NAMES

8. ~~Create relationships~~ with EPA
   PARTNER
   a. Jim—Bob
   b. Dan—Susan HEDMAN
   c. Mike & Steve—Karen & Mike
   d. George—Tom Burke
   } NEED LAST NAME

9. Meet with Mott FOUNDATION to discuss Lead Service Line Identification Study

10. Lead Education Program
    ~~a. Nick & Dan.~~ - DHHS ~~Point~~ LEAD

11. Moving KWA forward
- PROACTIVE MEETINGS WITH KWA

~~10~~. Enforcement response ~~#~~ to letter sent ON (DATE)
   a. With until after Dec 30th

12 ~~11~~. ~~TAC monitor closely~~ PARTICIPATE ACTIVELY WITH TAC

UTILIZE
13 ~~12~~. ~~Dan bring in~~ Joan Rose & MSU water expertise

14 ~~13~~. Public Outreach
   a. Mayor
   b. GCHD - GENESEE COUNTY HEALTH DEPARTMENT
   c. Dr. Reynolds, Wells & Davis
   d. Ministers
   e. Land Bank
   f. Legislators
   g. citizens

~~16. Communicate with other PWS's~~ DELETE

OUTREACH TO
15 ~~14~~. ~~Letter to~~ schools
   a. EPA guidance on testing
   b. Work with state superintendent

SYSTEMS
18. ~~Need list of schools out of compliance~~ MONITOR LEA

16 ~~15~~. Make recommendations to EPA about LCR

~~#16~~ #17

EPA's guidance provides a protocol for testing water in schools and recommends that schools take action at fixtures where the lead concentration exceeds 20 ppb. This concentration differs from the 15 ppb action level that public water systems are required to follow. The 20 ppb action level is based on a smaller sample collection volume of 250 milliliters (ml) and is designed to pinpoint specific fountains and outlets that require attention. When testing fixtures, the levels of lead are expected in the initial flush of water that has been sitting in the pipes. The 15 ppb action level required for compliance with the LCR calls for a tap sample volume of 1000 ml (1 liter), and is designed to identify system-wide problems. If a one liter sample was collected from a drinking water fountain in schools, the initial high concentrations might be diluted by the later part of the sample, which could show lower concentrations. The 20 ppb school level is not inconsistent and likely is more stringent because it reflects a more concentrated sample; 20 ppb in a 250 ml sample would correspond to about 12 ppb in a one liter sample.

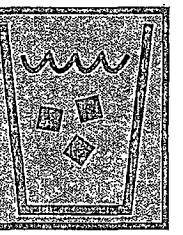
TAKING ACTION ON FLINT WATER

www.mi.gov/FlintWater

- Tips for Flint Residents -

Lead plumbing is common in homes built prior to 1986, and **anyone in the state with lead pipes in their home can take some extra precautions** to minimize lead in their drinking water.

1. Get your water tested at no cost to ensure water is safe. **To get your water tested**, please call the city of Flint Water Plant at (810) 787-6537 and then press 1.



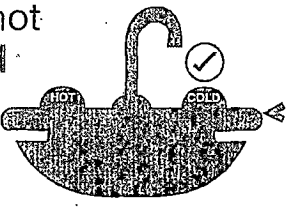
2. To ensure safe drinking water, you can also get a free filter. Please visit **mi.gov/FlintWater** to find where you can get a free filter.

3. It takes time for lead to accumulate in drinking water from plumbing, and so **flushing your pipes prior to using them** can minimize your exposure.

To flush your pipes, run the water until it's as cold as it will go. This can take as little as 5 to 30 seconds if you have recently flushed the toilet or otherwise used water in your home, or as long as 2 to 5 minutes if you have not used any water in hours.

In the city of Flint, **running the water for 5 minutes costs between 3 and 16 cents.**

4. Additionally, more lead gets into hot water than cold water. **Use only cold water for drinking, cooking and making baby formula.**



To get your water tested for free, please call the city of Flint Water Plant at (810) 787-6537 and then press 1.
You can also email flintwater@cityofflint.com

Visit www.mi.gov/FlintWater for more information.

MARK ARCHIVIST / EVENT REP
IN SUBJECT LINE SO
EMAILS DON'T GET DELETED

GEORGE K BEING MADE AWARE OF POINT OF
DER SIDE OF THE ACTION PLAN

* - APPROPRIATE PERSONS TO BE INVOLVED FOR SOME SESSIONS
- EM → "THIS WILL NOT BE EASY"

* - NEED TO MAKE A DECISION FIRST OR DEFER UNTIL
OR OPTIMISE FIRST WHEN

10/26/ Revised

Issued for DEQ Sampling Staff

DRAFT – WORK IN PROGRESS

Protocol for Collecting Water Samples at Schools for Lead Analysis

The following is the procedure being used by the Michigan Department of Environmental Quality to ensure samples from schools on city of Flint water are collected in a systematic, consistent manner to provide meaningful results. By following the below procedures school and health officials will have information to be able to identify and correct sources that contribute lead into drinking water. The procedures being used are:

- With the assistance from Department of Licensing and Regulatory Affairs (LARA) staff, conduct an on-site assessment of the building plumbing to identify plumbing components of concern and prioritize sample sites.
- DEQ and LARA staffs collect the samples from prioritized sites and in the sequence recommended by LARA.
- Submit the samples and appropriate paperwork to the DEQ Drinking Water Laboratory.
- Laboratory performs analysis and informs DEQ (ODWMA) staff of the results.
- DEQ informs DHHS of test results, and they jointly interpret the results.
- DHHS and DEQ staff relays the results to school officials and confers on any follow-up or corrective remedies that may be needed.

Step 1 – Prepare for On-Site Assessment

In order to assist LARA staff to identify and prioritize sample sites, school staff are being asked to compile, collect, and review any records pertaining to the building plumbing. This includes building permits, plumbing permits, as built plans, and information about the service line and all potable water pipes, fixtures and appurtenances within the building. At a minimum, a diagram of each floor layout should be provided. In addition, answers to the following questions will help streamline the on-site assessment process.

- When was the facility built?
- Have new buildings or additions been added? If so, when were they added? If built since 1986, were lead-free plumbing and solder used?
- When were the most recent plumbing repairs made and where were they located?
- What are the potable water pipes in the facility made of and what is their location? Options include: lead, brass, copper, plastic, galvanized metal and other materials. What materials were used to solder the potable water pipes in the system? Are brass taps, fittings or valves used? Note the locations.
- How many of the following outlets provide water for consumption: Bubblers, ice makers, water coolers and kitchen taps. Note their location. Include taps that might be used for making coffee or preparing formula.
- What brands and models of water coolers (cooled drinking fountains) provide

water in the facility and what is their location?

- Do faucets have accessible screens and have they been cleaned?
- Can you detect any signs of corrosion, such as leaks, rust-colored water or stains?
- Is any electrical equipment grounded to water pipes?
- Are there any records of previous water testing?

Step 2 – LARA Arranges for On-site Plumbing Assessment

LARA staff will contact school officials/staff and set a date and time for the assessment. A school representative familiar with the building layout and plumbing system should accompany LARA staff as they conduct the assessment. A room reserved for records review should also available. If possible, a DEQ staff person will also accompany and assist LARA staff performing the on-site plumbing inspection.

As part of the on-site assessment, LARA staff should identify if there is any water treatment being done in the building, i.e., point of use (POU) or point of entry (POE).

Step 3 – LARA Prioritizes Sample Sites and Sampling Sequence

This protocol is for all faucets, taps and outlets that are used regularly by students and staff for drinking, cooking, making coffee or food preparation to be sampled. Sampling locations include:

- Drinking Fountains (both bubblers and water cooler style).
- Kitchen Sinks, faucets or taps.
- Breakroom, classroom, teachers' lounge or other sinks known to be or visibly used for consumption (water glasses or coffeemaker and/or cups are nearby).

LARA staff will assign a sample site Identification (ID) number for each sample site and will determine the order in which each site is to be sampled. The ID number will reflect the type of tap/outlet and location. Each sampling location will be documented with digital photos, if possible. Staff should record any model number of faucets, valves, etc. that are accessible to inspection. If potential brass devices are seen they should be noted.

To determine the sampling sequence, LARA staff will identify the site closest to the service line to be collected first. LARA staff will then determine the appropriate sequence/order to sample each outlet beginning closest to the water main and continuing out farther from the service line until the site the farthest away is sampled last. This will minimize the chance that the piping may be flushed by a downstream or other sample location prior to collecting the samples at that site.

LARA staff will also identify any water coolers that should have been removed under the Lead Contamination Control Act (LCCA) in 1988. The LCCA mandated the repair, replacement or recall and refund of drinking water coolers with lead-lined water tanks.

DRAFT

LARA staff will confirm that there are no recalled water coolers on-site. Any coolers that should have been removed will be marked for removal or replacement.

Step 4 - Labeling the Sample Sites and Preparing Labels for the Bottles

Coding Scheme for Water Outlets

A drinking water bubbler (DW) on the 2nd floor (02) of the middle school (MID), the 15th outlet counted, might be coded as follows.

- MID- 02- DW-015
- DW= drinking water bubbler
- WC = water cooler (chiller unit)
- CF = classroom faucet
- KC = kitchen faucet, cold
- KH = kitchen faucet, hot
- EC = home economics room, cold
- EH = home economics room sink, hot
- BF = bathroom faucet
- NS = nurse's office sink
- SC = service connector

In addition to the unique outlet code, a unique sample identifier is necessary since four samples will be taken from each outlet.

For example, the first draw (P1) and flush (F1) samples taken for the above outlet would be MID- 02- DW-015-P-01, and MID- 02- DW-015-F-01.

- P = primary (first draw) sample – P1 and P2
- F = flush
- 01 = first flush sample at 30 seconds
- 02 = second flush sample at 2 minutes

Step 5 – Prior to Sample Collection

Once LARA staff has labeled each outlet, school personnel should ensure that the labels are maintained. Even after the initial sampling, it will be important to keep a record of each tap designation so that any future or follow-up sampling can be correlated to the correct outlet. Digital photos will assist with this if necessary.

Also, since drinking water has not been consumed from taps within the school buildings for several weeks, it is important to flush the taps the day prior to the sampling. For purposes of these sampling events, at the time of the on-site assessment LARA staff will ensure that each sampling location is run for two minutes to clear the faucet. This should be sufficient as long as the sampling teams are scheduled to arrive the next day to collect samples.

Each outlet should be labeled and posted **"DO NOT USE"** so that no water is used before sampling occurs. The sample sequence will be determined by LARA so that sampling will occur closest to the water main/service line provided by the city.

Step 6 – Collect the Samples

After the sites and order of collection have been determined by LARA staff, and the taps flushed, samples will be collected the next day by DEQ and LARA staff. School personnel will be notified to ensure water is not used in the building. (Scheduling for sampling should confirm that there are no evening activities in the building or on-site the night before sampling). In addition, no outlets or water should be used in the building until sampling is completed. Use of bathrooms, etc. could draw fresh water through the piping system and alter the effects of stagnation.

Sampling containers will be provided to by the DEQ Drinking Water Laboratory.

1. Four samples will be collected from each designated sample site. There will be four 125 milliliter (ml) samples collected at each outlet. Sample units for this evaluation/survey will be designated 32CC.

2. Collect all water samples before any water is used. Ideally, the water should sit in the pipes unused for at least 8 hours but not more than 18 hours before a sample is collected.

3. Notes should be taken at each sampling location regarding any treatment device that may be present (e.g., is there an in-line filter at that location) and whether the outlet/tap has an aerator present. Document other noteworthy items for each location.

4. Do not remove the aerator if there is one.

5. Assign an appropriate sample Identification (ID) number to each sample collected. Record this number (including the flush time) on the sample container and the request for water analysis form.

6. The four samples from each site are to be collected as follows: 2 – consecutive first draw samples, after a 30 second flush, and a 2 minute flush as follows:

    a. After the appropriate 8 – 18 hour stagnation time, place the first bottle under the tap, open the tap to produce a slow, steady "pencil thin" flow and fill the first bottle to the appropriate level and immediately fill a second bottle without a break in stream (do not turn off the tap between the first and second bottle and do not allow water to run down the drain in between the first and second bottle).
    b. Turn off tap. Cap, label the first and second bottles, and record sample information on the request for water analysis form.
    c. Mark the cap of the first bottle with a sharpie indicating #1.
    d. Mark the cap of the second bottle with a sharpie indicating #2.
    e. Turn on tap as before and after 30 seconds, fill the third bottle.
    f. Turn off tap. Cap, label bottle, and record sample information on the request for water analysis form. Mark the cap of the third bottle with a sharpie indicating #3.
    g. Turn on tap as before and after 2 minutes, fill the fourth bottle.

DRAFT DELIBERATIVE. NOT SUBJECT TO FOIA.

h. Turn off tap. Cap, label bottle, and record sample information on the request for water analysis form. Mark the cap of the fourth bottle with a sharpie indicating #4.

7. Make sure to mark the bottles as "P1" first draw 1, P2 "first draw 2", F01 "30 sec flush" or F02 "2 min flush" and also indicate this information on the request for water analysis form.

8. Secure the appropriate request for water analysis form to the appropriate bottle (refer to the example bottle provided for "instructions") with a rubber band.

9. Bundle the four samples collected at each individual sampling location (after the proper paperwork has been banded to each bottle) and secure the four samples together with a single rubber band.

10. Collect the remainder of the samples from all designated sites in the pre-determined order as recommended by LARA.

11. Deliver the samples to the lab.

How to Collect an Initial (First Draw) Sample

- Make sure you have clean hands.
- Complete the sample recording form.
- Only use containers (125 ml) supplied by the DEQ Drinking Water Laboratory.
- Containers should not be opened until you are ready to collect the sample.
- Sampling containers that have been compromised in any way, e.g., by being touched on the threads or the interior surfaces, must not be used.
- Keep food and drink away from the sample and its container.
- Make sure no water has been withdrawn from the tap or water fountain before you collect the sample.
- Place the container under the faucet or drinking water fountain that is being tested and collect 125 ml of water.
- If a faucet is being tested make sure you turn on the cold water tap.
- Turn on the water and fill the container without allowing any water to run down the drain.
- Make sure the container is labeled with the same information as the request for water analysis form.
- Deliver samples to the lab promptly.

How to Collect Flush Samples

Before the first flush sample is collected, allow the water to run down the drain for 30 seconds. Then collect a sample using the same protocol as above. Do not turn off the tap or adjust the flow of water between the "flush" and collecting the sample.

DRAFT DELIBERATIVE. NOT SUBJECT TO FOIA.

Before the second flush sample is collected, allow the water to run down the drain for 2 minutes. Then collect a sample using the same protocol as above. Do not turn off the tap or adjust the flow of water between the "flush" and collecting the sample.

Step 6 – Consecutive/Sequential Samples

Once all 125 ml samples have been obtained, sampling will begin to collect ten consecutive/sequential 1 liter samples at three locations.

Depending on the number of sampling taps in the building, select three locations as follows:

1. For a location close to the water main service: choose an outlet that is within 4 to 6 taps away from the water main. Do not use a tap that is closer than recommended to the water main.
2. For a mid-point location: choose an outlet this is within +/- 5 taps in the middle of the longest pipe run. This may or may not be the mid-point of a building or floor.
3. For an endpoint tap: select an outlet that is 3 to 4 taps from the identified end of the plumbing pipe run.

To collect ten consecutive/sequential 1 liter samples:

1. Begin sampling the first liter bottle as a first draw sample. Label the cap #1.
2. Fill ten 1 liter bottles consecutively without letting the water run down the drain.
3. Label each bottle cap with the number of the bottle in sequence.
4. Fill out a request for water analysis form for each bottle. Analysis code is 36CC.
5. Wrap each request for water analysis form around the appropriate bottle and use a rubber band to secure it.
6. Deliver the sample bottles to the DEQ Drinking Water Laboratory.

Step 7 - Laboratory Performs Analysis

Samples delivered to the DEQ Drinking Water Laboratory will be analyzed in accordance with the Laboratory Services Standard Operating Procedure Document SOP #800 Revision #4 Effective Date 10/2015.

Applicable analytical methods will be in accordance with the Method for Determination of Metals in Environmental Samples, Supplement I, U.S. Environmental Protection Agency, Method 200.8, 1999 Revision 5.5.

All Method Detection Limits shall be performed according to the Code of Federal Regulations, Title 40, Part 136, Appendix B.

Analytical quality control will be in accordance with SOP #800 Revision #4.

Step 8 – Laboratory reports results to DEQ – ODWMA and DHHS staff

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City of Flint Water
Action Steps for Week of October 26-30

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Conduct After Action Plan	DEQ	George Krisztian	Meeting held on 10/29/15 to discuss time line
2.	Introduce legislative changes to Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone George Krisztian Sonya Butler	Draft language submitted to Maggie Pallone for review
3.	After Action Review Panel	DEQ	Madhu Anderson George Krisztian Karen Tommasulo	Panel created and press release issued on 10/21/15
4.	Staff hiring plan	DEQ	Jim Sygo Maggie Pallone George Krisztian	Negotiations underway to contract with the Genesee County Health Department
5.	Finalize fiscal year 2017 budget request	DEQ	Maggie Pallone George Krisztian	
6.	Meeting(s) with school staff/management	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	A summary report for Freeman Elementary School has been drafted
7.	Meet with DHHS and discuss all lead education material for schools	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	Meeting held on 10/27/15; action items created
8.	Review corrosion control treatment plan and get any EPA comments	DEQ and EPA	Jim Sygo Steve Busch Pat Cook Mike Prysby	EPA's comments were addressed, and a letter was e-mailed to the city of Flint on 10/30/15

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
9.	Review construction permit application and issue construction permit for phosphate equipment	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	Act 399 permit issued 10/28/15
10.	Review Standby Operation of Flint Water Treatment Plant with city of Flint	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Comments by DEQ to city of Flint have been provided
11.	Work with Karegnondi Water Authority (KWA) and other agencies to address bottleneck issues; check weekly for status update	DEQ and KWA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Issues regarding soil erosion controls during construction are being addressed
12.	Contact city of Flint for Service Line Record status update and obtain a copy of the records to date	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Cross-referencing process has begun
13.	Provide DHHS with any available cross-reference information	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
14.	Develop childcare facility guidance or review DHHS-related materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	Meeting held on 10/27/15; DHHS to provide materials
15.	Create a generic school sampling guidance document for statewide distribution; target audience: schools served by municipal water	DEQ and DLARA	Jim Sygo Steve Busch Richard Benzie	Final draft of school sampling protocol has been written and is awaiting final review

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
16.	Confirm plumbing assessment and sampling is scheduled for Brownell K-2 STEM Academy and Eisenhower Elementary School	DEQ and DLARA	Jim Sygo Steve Busch Mike Prysby	Assessments confirmed and complete

STATE OF MICHIGAN
EXECUTIVE OFFICE
LANSING

RICK SNYDER
GOVERNOR

BRIAN CALLEY
LT. GOVERNOR

CONTACTS:	FOR IMMEDIATE RELEASE
Sara Wurfel or Dave Murray Governor's Office: 517-335-6397 Brad Wurfel, 517-284-6713 Department of Environmental Quality Jennifer Eisner, 517-230-9804 Department of Health and Human Services	Thursday, Oct. 8, 2015

Gov. Rick Snyder: Move back to Detroit water provides best protection for public health in Flint

State, Mott Foundation and city form partnership to fund switch

FLINT, Mich. – Flint families and children will be better protected by reconnecting with the Great Lakes Water Authority as the source of the city's drinking water, Gov. Rick Snyder said.

Snyder said Thursday that he will request the state Legislature to provide half, or $6 million, of the $12 million needed to reconnect with the authority. The Flint city government will provide $2 million and the Charles Stewart Mott Foundation will donate $4 million.

"All Flint residents need clean, safe drinking water," Snyder said. "The technical experts helping the city on its water advisory all agree this move back to the Great Lakes Water Authority provides the best public health protection for children and families. This effort today is the result of people coming together to solve a problem. I appreciate Detroit's willingness to reconnect with Flint, the Mott Foundation's generous donation, and the dedication of all parties to come together to protect Flint families and children."

The Michigan Departments of Environmental Quality and Health and Human Services today also committed an additional $3.5 million for water filters, free lead testing through the state laboratory for Flint water customers, and hiring additional staff to conduct health exposure monitoring for lead in drinking water.

Flint city leaders requested the state's help to fund the reconnection after a Wednesday meeting of Flint's Technical Advisory Committee. Flint's move to the Great Lakes Water Authority is expected to cost about $1.3 million per month until the Karegnondi Water Authority is completed next summer.

INSERT MAYOR QUOTE HERE

The move to Detroit water, which is drawn from Lake Huron, carries many public health benefits. As large bodies of water, the Great Lakes are naturally prone to fewer problems from large rain events and other runoff issues that can be present in shallower rivers. Additionally, the Great Lakes Water Authority has already fully optimized its corrosion control, using phosphates to help coat the insides of pipes and prevent lead from leaching into the water.

However, reconnecting with the authority will not completely resolve the city's problem with lead service lines or aging infrastructure. It will take time for pipes in Flint to become coated with the phosphate corrosion control. Additionally, some households in the city could experience lead in their drinking water until all lead pipes and plumbing are replaced.

INSERT MOTT FOUNDATION QUOTE HERE

To best protect public health, Snyder said state and local authorities will continue to carry out steps outlined on Oct. 2 in a comprehensive action plan, including continued testing, the use of faucet filters and providing residents with accurate information about steps to eliminate lead exposure.

Free filters are available for current MDHHS clients at the 125 E. Union St. or 4809 Clio Road MDHHS office locations. For residents who are not currently enrolled in MDHHS assistance programs, free filters are available at the Genesee County Community Action Resource Department offices at 2727 Lippincott and 601 North Saginaw in Flint. Staff will be at all four locations from 9 a.m. to 4 p.m., Monday through Friday, to distribute filters and assist residents who have questions about proper installation. At the Lippincott location only, extended hours will be offered this weekend, including until 7 p.m. on Thursday and Friday and from 10 a.m. to 2 p.m. on Saturday.

Other good practices for residents concerned about lead include turning on the cold water tap and running the water until it's as cold as it will go. Additionally, only use cold water for cooking, drinking and especially mixing baby formula.

School test results released; more investigation planned

The state today also released the first results from its lead screening program in schools and homes. Of 37 total samples taken at 13 buildings, four samples spread over three buildings exceeded the federal action level of 15 parts per billion.

However, this sampling provides only an initial screen, and the state is committing to further testing water and inspecting plumbing at these schools. Until testing is complete, schools are advised to continue using bottled water and filtration as a precaution to protect children.

In addition, free testing is still available for any other Flint school, including daycares and Head Starts. Free testing is also available for any Flint resident.

Additional information, including more detailed lead screening results, is available at www.michigan.gov/flintwater.

###

Response to Corrosion Control Questions

- Lime Softening can affect the pH in water
- The pH of the water is one physical characteristic that can affect the leaching of lead from pipes into the water
- As per the requirements in the Lead/Copper rule the Flint Water system was evaluated for two consecutive monitoring periods and the results of the monitoring demonstrated that further action was necessary.
- The DEQ promptly notified the Flint water system of the need for additional measures and the city of Flint promptly began putting together an action plan to address this need.

Michigan Department of Environmental Quality
News Release

Nov. 9, 2015

For More Information:
Staff Contact, 000-000-0000, email@michigan.gov

Freeman Elementary water testing shows lead exposure limited to fixtures

Experts release water testing results on schools and homes in Flint

As part of Gov. Rick Snyder's action plan for Flint drinking water, the DEQ today released water testing data from nearly 400 homes and businesses in Flint as well as comprehensive sampling results from Freeman Elementary School.

Both sets of data indicate the problems with lead are localized to individual buildings or even individual faucets, rather than system-wide issues.

"The results from this data underline the need for water testing at all homes, businesses, schools and other buildings in Flint," DEQ said. "Problems with lead exposure appear to be localized to individual service lines or plumbing fixtures, and we want to see all families in Flint take advantage of free water testing from the state."

Freeman Elementary testing results
At Freeman Elementary, 31 faucets were tested four times each. Twenty-two points did not show elevated lead exposure, but nine faucets came back with initially high results.

Those nine outlets involve brass components, indicating the problem involves the fixtures. When the faucets and fountains were operated for several minutes, lead levels fell to low and non-detectable levels.

Additional testing designed to look deep into the school's plumbing did not suggest larger, systemic problems.

Freeman Elementary has several options for remedying the problems at these nine faucets and fountains. The school can elect not to use those particular fountains, or implement a flushing regimen. The sampling results indicate that for all but one tap, a 3- to 4-minute flushing period each morning would drastically reduce lead exposure.

For a permanent solution, the school could opt to replace the faucets and fountains of concern.

Quote from Superintendent

For Freeman Elementary's complete sampling results and more information about how sampling was conducted, visit www.michigan.gov/flintwater.

OK

Briefing Paper for Call with MDEQ on July 21, 2015
MDEQ Implementation of LCR Rule and Flint Issues

Issue #1: Is there a public health concern regarding lead in Flint or other regulatory requirements?

- Under State policy ODWMA-399-027, the wholesale system is responsible for corrosion control treatment. Detroit, as the wholesale system, was providing this for Flint. When Flint changed to no longer be a consecutive system, and instead using the Flint River as its water source, it did not begin its own corrosion control program and is not currently practicing corrosion control treatment at the Water Treatment Plant.
- Prior to the change from being a consecutive public water system to the Detroit Water and Sewerage Department (DWSD) system and associated switch in source water, the City of Flint was conducting LCR sampling every three years. Due to the switch in water sources, the Michigan Department of Environmental Management (MDEQ) required the City of Flint to increase the number of monitoring sites from 50 to 100 sites for two consecutive rounds of monitoring (July through December 2014 and January through June 2015).
- The first round of samples after switch-over from DWSD (July 1, 2014 – Dec 31, 2014) had 90th percentiles of 6 ppb for Lead and 110 ppb for Copper.
- As of June 30, 2015, we believe MDEQ received all 100 sample results from the second round of monitoring and is incorporating citizen-requested sample results that meet the Tier 1 criteria.
- HQ confirmed, per the Water Supply Guidance #174 that citizen-requested sample results should be included in the 90th percentile calculations.
- We believe that the results of the two rounds of sampling will support an exceedance of 5 ug/l. This will result in the need for a corrosion control study, but not public education.
- Flint plans to switch to another source in 2016 making the corrosion control study timing complicated.
- Compliance with other regulatory requirements: Appears to be doing fine with Stage 2 DBP rule and re-characterizing the distribution system based on the new source of water, but not sure about LT2 compliance for first round monitoring for cryptosporidium. We'd want to ask if Flint had existing data on Crypto for the Flint River (they would be allowed to grandfather data for the 1st round of sampling). If not, they'd need to start sampling as soon as possible to get 1st round crypto results). If they did have old data, they'd still be expected to start a 2nd round of Crypto monitoring already (April 2015 – since Flint's population is still above 100,000).

Discussion Items:

Criteria for large systems (serving >50,000 persons) to install/ maintain corrosion control treatment:	**Action Level (AL) Exceedance:** If exceed Pb AL of 0.015 mg/L expressed as 90th percentile level based on samples at tap:
If 90th percentile tap lead value minus source water lead value greater than or equal to 0.005 mg/L	• Corrosion control treatment steps • Source water treatment steps • Public education • Lead service line replacement *(if continue to exceed Pb AL after installing treatment)*

- **Discuss most recent 2 rounds of 6-months monitoring results and 90th percentile calculations and inclusion of the citizen-requested samples.**
- **Based on results, what are the next steps?**
- **Set the stage for why we are concerned about lead levels – since Flint is not feeding phosphate and the lead, phosphate, and cadmium are tracking, the phosphate is likely coming off the pipes.**
- **Is there anything we should do now to reduce the exposure risk to lead?**
- **Discuss possibly accelerating a corrosion control study for Flint. However, this should be done with a comprehensive look at all rule requirements and treatment needs. EPA/ORD expert are available to assist.**
- **How is Flint doing with meeting all the other regulatory requirements? Are they meeting LT2 requirements for crypto monitoring?**

Issue #3: Discuss Pre-flushing (as time allows)

- Lead compliance sampling procedures in the state of Michigan comply with Federal SDWA requirements which calls for a minimum of 6 hours during which there is no water used from the tap the sample is taken from. While pre-flushing may fall within a strict legal interpretation of the regulations, we believe that it goes against the intent of the monitoring protocol, since it changes the normal water use of the homeowner in the sample.
- Michigan is the only Region 5 State that requires pre-flushing.
- Attachment 1 provides a brief description of pre-flushing.

FLINT DRINKING WATER EVENTS TIMELINE

Draft

Date	Event	Attachment
Pre-1967	Flint Water Treatment Plant in operation using Flint River (see Flint Brochure)	
Post-1967	Flint switched to DWSD for drinking water	
Mid-2000s	Discussions began regarding Karegnondi Water Authority	
2009	KWA Report (need title)	
2011	Analysis of the Flint River as a Permanent Water Supply for the City of Flint; Prepared for: City of Flint. (Provided to DEQ March 2013)	
April 2013	Flint notifies DWSD of contract discontinuation and joins the Karegnondi Water Authority	
April 2013	DWSD sets termination of Flint water service contract to April 17, 2014	
June 2013	Karegnondi Water Authority groundbreaking	
	Add Construction Permits here	
June 2013	Flint notifies DEQ of intent to use of Flint Water Treatment Plant full time with Flint Water	
May 2014	Flint stops purchasing DWSD water. Starts using the City of Flint WTP and Flint River	
Aug 2014	Flint E.Coli Bacteria violation, Localized System Boil Water Advisory	
Aug 2014	Disinfection Byproducts, DEQ requests preemptive Operational Evaluation	
Sept 2014	Flint Total Coliform Bacteria violation, Localized System Boil Water Advisory	
Oct 2014	General Motors announces decision to stop using Flint water	
Nov 2014	Disinfection Byproducts violation begins	

FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
Jan 2015	1st 6-month lead and copper sampling completed 100 samples, 90th% = 6 ppb	
January 21, 2015	City of Flint Public Meeting	
February 26, 2015	E-mail from EPA regarding one high lead sample.	
February 27, 2015	E-mail from EPA inquiring about Optimized Corrosion Control Treatment	
February 27, 2015	DEQ response (includes misstatement regarding Optimized Corrosion Control Treatment).	
April 6, 2015	Proposal from Flint regarding installation of Granular Activated Carbon to reduce TTHMs.	
April 23, 2015	EPA e-mail regarding corrosion control treatment.	
April 24 and May 1, 2015	DEQ responses regarding corrosion control treatment	
April 27, 2015	EPA provided bottles to 212 Browning for lead/copper analyses.	
May 6, 2015	Lead service line replaced at 212 Browning. EPA on-site. EPA retained piece of lead service line. Indicates a report will be forthcoming.	
May 27, 2015	EPA e-mail indicating homes on each side of 212 Browning were sampled (15 samples per house).	
May 28, 2015	EPA e-mail regarding results at 212 Browning – all samples ok.	
June 9, 2015	2nd Violation Notice for TTHM	
June 10, 2015	Conference call with EPA	
June 30, 2015	Email from EPA regarding high lead result and concerns regarding corrosion control. Scheduled conference call for July 21, 2015.	
June 30, 2015	2nd round of Pb/Cu monitoring concludes.	

FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
July 1, 2015	EPA summary of conference call on June 10, 2015.	
July 9, 2015	Reporter informs DEQ that EPA draft interim memo is on ACLU website.	
July 21, 2015	Conference call with EPA. First mention of alternate interpretation by EPA. EPA indicates will follow up with legal review.	
July 24, 2015	DEQ email –determination of 90th percentile calculation = 11ppb and City of Flint needs to add corrosion control treatment.	
July 28, 2015	DEQ received blood Pb level information from DHHS indicating that results since the switch to the Flint River are consistent with past years seasonal variations.	
August 4, 2015	Meeting with city representatives at Governor's office.	
August 17, 2015	DEQ notifies Flint of Pb/Cu monitoring results and requires City to install corrosion control treatment. (2nd 6-month lead and copper sampling completed 69 samples, 90th% = 11 ppb)	
August 23, 2015	DEQ receives first contact from V-T researcher (Marc Edwards) informing DEQ that he is beginning a study of water quality in Flint and publishing results on website.	
August 25, 2015	DEQ email to resident (LeeAnne Walters) at 212 Browning in follow-up to August 4, 2015 meeting.	
August 28, 2015	EPA comment on V-T researcher beginning study in Flint.	
September 2, 2015	Disinfection Byproducts (TTHM) return to compliance	
September 11, 2015	EPA email confirming that DEQ was never sent the draft June 24, 2015 memo even though it appears that DEQ was cc'd on the document.	
September 21, 2015	Meeting with Congressional representatives, legislators, EPA and DEQ to discuss issues with water quality in Flint.	

FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
September 22, 2015	Meeting/Conference call with DHHS, GCHD, and DEQ to discuss lead education/outreach.	
Sept 24, 2015	Hurley Children's Hospital data reveals ~~high~~ elevated lead levels in Flint children	
September 25, 2015	Flint issues Lead Advisory	
October x(check on date for this), 2015	State screening results show elevated lead levels in Flint schools	
October 1, 2015	GCHD issues "Do Not Drink" Advisory	
October 2, 2015	DEQ and DHHS press conference. Governor's Flint Action Plan announced.	
October 2, 2015	GCHD school screening samples collected.	
October 8, 2015	Governor Press Conference. Flint to reconnect to Great Lakes Water Authority.	
October 15, 2015	State Legislature authorizes a $9 million to assist the City of Flint to pay for the return to the Detroit water system and to fund staff at schools to gauge lead exposure	
October 16, 2015	First weekly coordination meeting held with the City of Flint and state agencies	
October 16, 2015	DEQ meets with Flint Schools Superintendent and Genesee County Health Department	
October 16, 2015	Flint switches back to DWSD for water	
October 21, 2015	Governor Snyder announces formation of Flint Water Task Force to complete an After-Action Review	
July 2016	Planned connection to Karegnondi Water Authority (Lake Huron water to Flint WTP)	

9/27/15 DAN TALKS TO HEDMAN

9/28 10 PT PLAN

9/30 EDEN CONFIRMS HURLEY DATA

FLINT DRINKING WATER EVENTS TIMELINE

Government messed up in Flint water crisis, what next?

By Nancy Kaffer, Detroit Free Press Columnist *11:28 p.m. EDT October 29, 2015*



(Photo: Ryan Garza, Detroit Free Press)

We know what happened in Flint:

The city's water treatment plant, with the state's blessing, didn't add the right chemicals to drinking water pumped from the Flint River. And that failure allowed the more-corrosive river water to leach lead from the city's aging pipes and through faucets throughout the city. Tens of thousands of people were exposed to lead poisoning, which will have irreversible effects on the city's children.

Government agencies are supposed to insist on proper water treatment to prevent this kind of thing — so what on earth happened in Flint?

It's a confounding question, and it's one that now falls to a state-appointed task force to answer.



DETROIT FREE PRESS

Help is on the way for lead-exposed Flint kids

(http://www.freep.com/story/news/local/michigan/2015/10/24/flint-lead-exposure-help-water-attisha/74383010/)

Over the next three months, the four members of that task force, each experts in their respective fields — policy, medicine, environment, public health — will sift evidence and ask questions about the public health crisis in Flint. They'll deliver what Gov. Rick Snyder calls an after-action report.

Flint's water crisis is the product of prolonged inaction, missteps or inexplicable laissez faire by multiple government agencies: the Michigan Department of Environmental Quality, the U.S. Environmental Protection Agency, Snyder's office and the City of Flint itself. And it leads to another hard-to-answer question: When something goes horribly wrong, how does government police itself?

What's required is accountability: Not just to lay blame, but to ensure that nothing like this ever happens again.



DETROIT FREE PRESS

Is emergency manager law to blame for Flint water crisis?

(http://www.freep.com/story/news/politics/2015/10/24/emergency-manager-law-blame-flint-water-crisis/74048854/)

Let's recap: In 2013, the financially beleaguered City of Flint opted to join a new regional water authority, set to open in 2016. In 2014, Flint began to pump its water from the Flint River while the new system was under construction, in part because the Detroit Water and Sewerage Department raised its rates after Flint pulled out of its system. Both decisions, based at least to some degree on cost, were made during the tenures of emergency managers appointed by Snyder; one, Darnell Earley, is now EM of Detroit Public Schools. In a statement to the Free Press, he disavowed all responsibility for the water switch, despite the fact that during his stint in Flint he was empowered by the governor to exercise sweeping authority.

When Flint began to pump river water, its treatment plant chose to add lime, lowering the acidity of the water, instead of phosphates, which form a barrier inside pipes that prevents lead from leaching into the water. MDEQ now says that lime didn't satisfy the EPA's lead and copper requirements. Over the last 18 months, Flint residents complained that the water smelled and tasted bad, and caused skin and other health problems, caused in part by coliform bacteria, and the disinfectant used to treat it.

Then lead test results began to roll in. The state's own test results showed lead levels almost doubling in six months. A Virginia Tech University researcher found increased lead in the city's water. A local hospital researcher found that an increasing percentage of children had elevated blood-lead levels. After months of denial, the state finally acknowledged in October that there was a problem. The city has since switched back to Detroit water, but it will be months before the phosphate coating is restored. The effects of lead poisoning are irreversible.

"You've got all these different agencies involved, so you need someone with a 30,000-foot view," said Andy Arena, head of the Detroit Crime Commission. As former special agent in charge of the FBI's Detroit office, Arena led the investigation that brought down former Detroit Mayor Kwame Kilpatrick, now serving time in federal prison on corruption charges. "Always, the issue is who do you get to do it?"

Michigan's attorney general can't investigate — that office is the attorney for MDEQ. Michigan doesn't have a special prosecutor system. U.S. Rep. Dan Kildee and state Sen. Jim Ananich, both Flint Democrats, have called for the EPA to investigate. But that agency advised Flint and MDEQ for months that its water treatment was inadequate, to little effect. And more troubling, an EPA employee e-mailed MDEQ officials to offer a rationale allowing them to deny having received a draft memo written by an EPA drinking water specialist about lead in Flint's water.

A task force like the one appointed by Snyder is the obvious solution, he said. "The issue is their reputations and all that, but what investigative experience do they have? A lot of the time, groups will hire actual investigators to go out and do the ground pounding, and then the commission will go out and review that."

Task force members are longtime Republican state legislator Ken Sikkema, now a senior policy fellow at Public Sector Consultants; Chris Kolb, president of the Michigan Environmental Council; Matthew Davis, M.D., a professor of pediatrics and internal medicine at the University of Michigan Health System and professor of public policy at the university's Gerald R. Ford School; Eric Rothstein, a national water issues consultant and principal at the Galardi Rothstein Group and Lawrence Reynolds, M.D., a Flint pediatrician who serves as president of the Mott Children's Health Center.

The task force's mission is complicated, and its role is strictly advisory. It can't exercise subpoena power, or make binding recommendations.

Because it reports to Snyder, neither the results of the investigation nor the task force's work product will be subject to the state's Freedom of Information Act — that's the law that requires the government to publicly release most documents created on the public dime. That's because Snyder, and other Michigan governors, haven't considered themselves subject to the act, to which all other governments in Michigan must adhere.

Sara Wurfel, Snyder's press secretary, said she expects the entities involved to cooperate with the task force, and said the governor will make its results public.

The task force members I spoke to said that public involvement and transparency were essential to the process.

And, Sikkema said, they're angry.

"We think that this is absolutely unacceptable," he said. "The motivation for all of us is a lot of passion. But we also need to, to some extent, look at this dispassionately ... skepticism and cynicism on the part of the people of Flint is justified, in terms of how this was handled. I don't presume this advisory panel in and of itself is going to be able to turn that around."

Kolb said the group will begin by developing a time line of what happened, and when. The time line will also track the state's response, and to focus on getting a pretty comprehensive timeline as to what happened when.

"There was obviously something going on that wasn't quite right, from the color, the smell, reactions to the water, to starting to get some test results," he said.

Sikkema said the group will look at the individuals involved, the rationale for decision making and federal and state law.

"We're concerned that a lot of people apparently weren't listened to in this fiasco," Sikkema said. "The people in Flint weren't listened to. (Virginia Tech University researcher) Marc Edwards wasn't listened to. (Hurley Medical Center's) Dr. Mona Hanna-Attisha apparently wasn't listened to. We want to know why not. There were other red flags that were ignored, like GM's decision to switch their water source" when Flint River water proved too corrosive for industrial use. "Why were their decisions ignored? All of that leads forward to actionable recommendations, so that this result we consider a travesty, a tragedy, a public health crisis — I don't think there are words strong enough to describe our feelings on this — never happens again."

The task force's work is an important first step in determining accountability. But it can't change policy. Or hold individuals responsible for the decisions that brought Flint to this pass. Or, in the event that it comes to this, bring criminal charges.

It's a start, but it can't be the finish.

Read or Share this story: http://on.freep.com/1MizWnC

Department of Environmental Quality
Drinking Water Program Budget Request
December 22, 2015

Appropriation	FTEs		Amount
One-Time (2016 Supplemental)			
City of Flint Emergency Water Services		$	3,900,000
• Support half of the cost for Flint to stay on the Great Lakes Water Authority water system for six additional months (July 1, 2016 - December 31, 2016) until the Karegnondi Water Authority pipeline is completed.			
• This request assumes the other 50% of the costs to stay on the existing system will be supported by funding from local partners.			
• There may be additional costs for Flint to connect to the Karegnondi Water Authority water system. This request assumes those costs will be a local cost and not funded by the state.			
Total One-Time Funding		$	3,900,000
Ongoing			
Drinking Water and Environmental Health			
Staff			
Corrosion Control Specialists	3	$	450,000
Sampling Staff	2	$	300,000
Lab Staff	3	$	450,000
Service Line Verification Staff	2	$	300,000
Total Staff	10	$	1,500,000
Local Health Department Contracts and Testing Fees		$	1,000,000
Lab Equipment		$	300,000
Travel		$	100,000
Other Supplies and Services		$	100,000
Total Ongoing Funding		$	3,000,000
Total Funding Request		**$**	**6,900,000**

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
Pre-1967	Flint Water Treatment Plant in operation using Flint River for drinking water	1
Post-1967	Flint switched to Detroit Water and Sewerage Department for drinking water	None
January 2006	Discussions regarding Karegnondi Water Authority, *Preliminary Long-Term Water Supply for Genesee County*	2
June 25, 2009 September 2009	*Lake Huron Water Supply Study* *Karegnondi Water Authority* Executive Summary and Preliminary Engineering Report	3
March 2013	*Analysis of the Flint River as a Permanent Water Supply for the City of Flint*; Prepared for: City of Flint dated July 2011	4
April 2013	Flint notifies Detroit Water and Sewerage Department of contract discontinuation and joins the Karegnondi Water Authority	5
April 2013	Detroit Water and Sewerage Department sets termination of Flint water service contract to April 17, 2014	6
June 2013	Flint notifies the Department of Environmental Quality of intent to operate Flint Water Treatment Plant full time using Flint River for drinking water	7
April 2014	The Michigan Department of Environmental Quality issues Flint Water Treatment Plant construction permits for full time operation enhancements	9
May 2014	Flint stops purchasing Detroit Water and Sewerage Department water. Starts using the City of Flint Water Treatment Plant and Flint River for drinking water	10
August 2014	Flint *E. coli* bacteria violation, localized system Boil Water Advisory	11
September 2014	Disinfection Byproducts compliance communication; the Michigan Department of Environmental Quality requests preemptive Operational Evaluation	12
September 2014	Flint total coliform bacteria violation, localized system Boil Water Advisory	13

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
October 2014	General Motors announces decision to stop using Flint River as source for production water	14
December 16, 2014	Disinfection Byproducts quarterly violation begins	15
December 31, 2014	1st 6-month round of lead and copper monitoring ends. Results due from Flint to Michigan Department of Environmental Quality on January 10, 2015	None
January 21, 2015	City of Flint Public Meeting regarding disinfection byproducts and bacteria	17
February 26, 2015	E-mail from United States Environmental Protection Agency to Michigan Department of Environmental Quality regarding elevated lead sample	18
February 27, 2015	E-mail from United States Environmental Protection Agency to Michigan Department of Environmental Quality inquiring about Optimized Corrosion Control Treatment	19
February 27, 2015	Michigan Department of Environmental Quality response to United States Environmental Protection Agency email with statement regarding optimized corrosion control program	20
March 5, 2015	2nd Disinfection Byproducts quarterly violation notice	21
March 30, 2015	Michigan Department of Environmental Quality notifies Flint of Lead/Copper Monitoring Results.	16
April 3, 2015	Long Term 2 Enhanced Surface Water Treatment Rule Letter	22
April 6, 2015	Flint proposes installation of Granular Activated Carbon Filter media to reduce disinfection byproducts	23
April 23, 2015	United States Environmental Protection Agency e-mail to Michigan Department of Environmental Quality regarding corrosion control treatment	24
April 24, 2015 May 1, 2015	Michigan Department of Environmental Quality responds to United States Environmental Protection Agency regarding corrosion control treatment	25

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
April 27, 2015	United States Environmental Protection Agency provided bottles to 212 Browning for lead/copper analyses	26
May 6, 2015	Lead service line replaced at 212 Browning. United States Environmental Protection Agency on-site	27
May 28, 2015	Internal United States Environmental Protection Agency e-mail regarding results at 212 Browning	29
June 9, 2015	3rd Disinfection Byproducts quarterly violation notice	30
June 10, 2015	Semi-Annual Conference call with United States Environmental Protection Agency	31
June 30, 2015	E-mail from United States Environmental Protection Agency scheduling conference call on July 21, 2015 regarding elevated lead result and concerns regarding corrosion control	32
June 30, 2015	2nd 6-month round of lead and copper monitoring ends. Results due from Flint to Michigan Department of Environmental Quality on July 10, 2015	None
July 9, 2015	Michigan Department of Environmental Quality informed that United States Environmental Protection Agency draft internal memo is on ACLU website	33
July 14, 2015	Michigan Department of Environmental Quality issues construction permit to Flint for Granular Activated Carbon filter media W151055	34
July 21, 2015	Conference call with United States Environmental Protection Agency (Lead and Copper Rule implementation and Flint) during which it informs Michigan Department of Environmental Quality its interpretation of Lead and Copper Rule	35
July 24, 2015	Michigan Department of Environmental Quality e-mail and draft letter 90th percentile lead determination = 11 parts per billion and City of Flint requirement to add corrosion control treatment	36

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
July 28, 2015	Michigan Department of Environmental Quality received blood lead level information from Michigan Department of Health and Human Services indicating that results since the switch to the Flint River are consistent with past years seasonal variations	37
August 4, 2015	Meeting with city representatives at Governor's office	38
August 17, 2015	Michigan Department of Environmental Quality notifies Flint of lead/copper monitoring results and requires City to install corrosion control treatment	39
August 23, 2015	Michigan Department of Environmental Quality notified by an external party that a water quality study was about to begin in Flint	40
September 2, 2015	Disinfection Byproducts return to compliance	43
September 11, 2015	United States Environmental Protection Agency e-mail confirming that Michigan Department of Environmental Quality was never sent the draft June 24, 2015 memo	44
September 21, 2015	Meeting with Congressional representatives, legislators, United States Environmental Protection Agency and Michigan Department of Environmental Quality to discuss issues with water quality in Flint	45
September 22, 2015	Meeting/Conference call with Michigan Department of Health and Human Services, Genesee County Health Department, and Michigan Department of Environmental Quality to discuss lead education/outreach	46
September 24, 2015	Hurley Children's Hospital data reveals elevated blood lead levels in Flint children	47
September 24, 2015	Michigan Department of Health and Human Services response affirms State blood lead level data is more comprehensive than Hurley Hospital data	None

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
September 25, 2015	Flint issues Lead Advisory regarding drinking water	48
October 1, 2015	State Chief Medical Officer confirms Hurley blood lead level data	None
October 1, 2015	Genesee County Health Department issues "Do Not Drink" Advisory	49
October 2, 2015	Michigan Department of Environmental Quality and Michigan Department of Health and Human Services press conference. Governor's Flint Action Plan announced.	50
October 2, 2015	Genesee County Health Department school screening water samples collected for lead analysis	51
October 8, 2015	Governor Press Conference: Flint to reconnect to Great Lakes Water Authority/Detroit Water and Sewerage Department	52
October 15, 2015	State Legislature authorizes a $9 million to assist the City of Flint to pay for the return to the Detroit water system and to fund staff at schools to gauge lead exposure	None
October 16, 2015	First weekly coordination meeting held between the City of Flint and state agencies	None
October 16, 2015	Michigan Department of Environmental Quality meets with Flint Schools Superintendent and Genesee County Health Department	None
October 16, 2015	Flint switches back to Detroit Water and Sewerage Department for water	53
October 21, 2015	Governor Snyder announces formation of Flint Water Task Force to complete an After Action Review	None
October 28, 2015	Michigan Department of Environmental Quality issues construction permit for additional corrosion control treatment	54
October 30, 2015	Michigan Department of Environmental Quality letter to Flint regarding corrosion control treatment operation	55

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
November 3, 2015	United States Environmental Protection Agency Memorandum regarding "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems"	56
November 4, 2015	United States Environmental Protection Agency Memorandum regarding "Transmittal of Final Report – High Lead at Three Residences in Flint, Michigan"	57
Mid-Late 2016	Planned connection to Karegnondi Water Authority (Lake Huron water to Flint Water Treatment Plant)	None

ACODE	ANALYTE	RESULT	SAMPNO	INVADD1	Sample Description	Site Code	System Owner
CU	Copper	0.28	LF86003	BROWNELL S T E M ACADEMY	DRINK FOUNTAIN GYM BATHROOMS	ID B2	
CU	Copper	0.06	LF86004	BROWNELL S T E M ACADEMY	DRINK FOUNTAIN ROOM 6 & 7	ID B1	
CU	Copper	Not detected	LF86005	1420 W TWELFTH ST	ACROSS FROM CAFETERIA DRINKING FTN		SOUTHWESTERN CLASSICAL ACADEMY
CU	Copper	0.22	LF86006	1101 W VERNON DR PIERCE ELEMENTARY	DRINKING FOUNTAIN MAIN HALL		FLINT PUBLIC SCHOOLS
CU	Copper	0.11	LF86007	1101 W VERNON DR PIERCE ELEMENTARY	CUSTODIAN OFFICE DRINKING FOUNTAIN		FLINT PUBLIC SCHOOLS
CU	Copper	0.26	LF86008	1420 W TWELFTH	DRINKING FOUNTAIN	BY ROOM 25	SOUTHWESTERN CLASSICAL ACADEMY
CU	Copper	0.57	LF86009	NORTHWESTERN HIGH SCHOOL	DRINK FOUNTAIN CAFE WEST	ID NW3	
CU	Copper	0.25	LF86010	EISENHOWER ELEMENTARY	FOUNTAIN GYM		CITY OF FLINT
CU	Copper	0.24	LF86011	1040 N SAGINAW ST	3RD FLOOR CAFETERIA	LOWER FTN	DOYLE RYDER ELEM
CU	Copper	0.10	LF86012	1518 UNIVERSITY AVE	2ND FLOOR FOUNTAIN	RM 19	DURANT TUURI MOTT
CU	Copper	0.07	LF86013	BROWNELL S T E M ACADEMY	DRINK FOUNTAIN ROOM 12	ID B3	
CU	Copper	0.14	LF86014	1040 N SAGINAW ST	2ND FLOOR LOWER FTN	RM 253	DOYLE RYDER ELEM
CU	Copper	0.36	LF86015	FREEMAN ELEMENTARY	FOUNTAIN NORTH END OF BLDG		CITY OF FLINT
CU	Copper	0.05	LF86016	HOLMES S T E M ACADEMY	DRINK FOUNTAIN D114	IDH3	
CU	Copper	0.11	LF86017	1518 UNIVERSITY AVE	3RD FLOOR FOUNTAIN	RM 25	DURRANT TUURI MOTT
CU	Copper	0.25	LF86018	1040 N SAGINAW ST	1ST FLOOR FTN	OUTSIDE GYM	DOYLE RYDER ELEM
CU	Copper	0.37	LF86019	1101 W VERNON DR PIERCE ELEMENTARY			FLINT PUBLIC SCHOOLS
CU	Copper	0.08	LF86020	1518 UNIVERISTY AVE	GYM/POOL DRINKING FTN		DURANT TUURI MOTT
CU	Copper	0.19	LF86021	HOLMES S T E M ACADEMY	DRINK FOUNTAIN BLUE HALLWAY C109	ID H2	
CU	Copper	0.06	LF86022	HOLMES S T E M ACADEMY	DRINKING FOUNTAIN OFFICE	ID H1	
CU	Copper	0.07	LF86023	923 E KEARSLEY	2ND FL BTN 207 & WMS RSTRM		
CU	Copper	0.31	LF86024	923 E KEARSLEY	1ST FL DRINK FTN	RECEPTION DESK	
CU	Copper	0.09	LF86025	305 WALNUT ST	KITCHEN FOOD PREP SINK	NE CORNER	CENTRAL KITCHEN
CU	Copper	0.16	LF86027	EISENHOWER ELEMENTARY	FOUNTAIN ROOM 209		CITY OF FLINT
CU	Copper	0.26	LF86028	FREEMAN ELEMENTARY	FOUNTAIN MIDDLE AT SCHOOL		CITY OF FLINT
CU	Copper	0.13	LF86029	NORTHWESTERN HIGH SCHOOL	DRINK FTN LIBRARY SOUTH	ID NW1	
CU	Copper	0.06	LF86030	923 E KEASLEY ADMIN	BASEMENT ADMIN	BTN RM 8 - 9	
CU	Copper	0.53	LF86031	305 WALNUT ST CENTRAL KITCHEN	KITCHEN FOOD PREP	MIDDLE OF KITCHEN	CENTRAL KITCHEN
CU	Copper	0.17	LF86032	305 WALNUT ST	DRINKING FTN	MIDDLE OF KITCHEN	CENTRAL KITCHEN
CU	Copper	Not detected	LF86033	NORTHWESTERN HIGH SCHOOL	DRINKING FTN LIBRARY NORTH	ID NW2	
CU	Copper	0.16	LF86034	2010 CRESTBROOK SCHOOL	LOWER DRINK FTN	NEXT TO GYM	NETHERCUT ELEMENTARY
CU	Copper	0.35	LF86035	2500 N AVERILL SCHOOL	HIGH DRINK FTN ACROSS FRM TEACH	BTRM NEXT TO LWR EL BOYS BTRM	POTTER ELEMENTARY #2
CU	Copper	0.49	LF86036	2500 N AVERILL SCHOOL	HIGH DRINK FTN SO ENTRANCE	NEXT TO GYM	POTTER ELEMENTARY #1
CU	Copper	0.14	LF86037	EISENHOWER ELEMENTARY	FOUNTAIN ROOM 102		CITY OF FLINT
CU	Copper	0.49	LF86038	FREEMAN ELEMENTARY	FOUNTAIN SO END OF BLDG		CITY OF FLINT
CU	Copper	0.10	LF86039	2010 CRESTBROOK SCHOOL	HIGH DRINK FTN	ACROSS FROM OFFICE	NETHERCUT ELEMENTARY

STATE OF MICHIGAN

DEPARTMENT OF HEALTH AND HUMAN SERVICES

LANSING

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MDHHS releases new report outlining blood lead levels in Flint

Follow-up care, case management resources continue for families

LANSING, Mich. – The Michigan Department of Health and Human Services today issued data regarding blood lead levels in Flint children and adults. The report is intended to inform residents about blood lead level testing efforts in Flint and provide cumulative total numbers.

"With the progress that we've made in testing and identifying those with elevated blood lead levels, the Department will continue to work closely with the Genesee County Health Department to reach these families and conduct case management to reduce their exposure to lead sources," said Dr. Eden Wells, chief medical executive with the MDHHS. "We will update these numbers on a regular basis and remain diligent in our ongoing outreach and education."

Between October 1 and October 30 of this year, there were 963 people tested in Flint. Of those children tested, 18 children 17 years of age or younger had elevated blood lead levels. Six adults over the age of 18 were identified with elevated blood lead levels during this same timeframe.

The data in the report include the total number of tests conducted and the total number of elevated blood lead levels greater than 5 micrograms per deciliter, and captures both capillary and venous blood tests. People who have had multiple tests are counted only once. The full report is posted online at www.michigan.gov/flintwater and will be updated as more data becomes available.

Last month, MDHHS collaborated with the Genesee County Health Department and local partners to distribute educational resources and informational letter to Flint parents regarding lead testing. GCHD nursing staff are conducting direct outreach to families when an elevated blood lead level has been detected, serving as an important resources by addressing questions and concerns, providing information, and meeting them in their home environment.

MDHHS continues to provide free water filters and replacement cartridges to Flint residents at four locations including the MDHHS Flint offices and the Genesee County Community Action Resource Department. For a full list of locations and hours of distribution, visit www.michigan.gov/flintwater.

To help residents properly install water filters, and to demonstrate how to replace the original when it expires, MDHHS has created an instructional on the MDHHS YouTube channel. For additional updates on Flint water including updates on blood lead levels and testing results, visit www.michigan.gov/flintwater.

###

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

August 17, 2015

Mr. Brent Wright
City of Flint - DPW
Flint Water Plant
4500 North Dort Highway
Flint, Michigan 48505

Dear Mr. Wright:

SUBJECT: Flint, City of WSSN: 02310
Lead and Copper Monitoring of Drinking Water Taps

The Department of Environmental Quality (DEQ), Office of Drinking Water and Municipal Assistance (ODWMA), received your report for the monitoring period January 1, 2015, through June 30, 2015.

Action Levels	Results this monitoring period			
	90th Percentile	# of Samples Above Action Level	# of Samples Required	# of Samples Collected
Lead 15 parts per billion (ppb)	11 ppb	6	60	69
Copper 1.3 parts per million (ppm)	0.16 ppm	0	60	69

Ninety percent or more of the sites you tested are within action levels under the administrative rules promulgated under the Michigan Safe Drinking Water Act, 1976 PA 399, as amended (Act 399). These results must be reported on your 2015 Consumer Confidence Report (CCR) due to our office, your customers, and the local health department, by July 1, 2016. Also include the following statement in the CCR, regardless of the lead and copper levels:

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Flint is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline at 1-800-426-4791 or at http://www.water.epa.gov/drink/info/lead.

Recent changes to the Lead and Copper Rule (LCR) require the water supply to provide individual lead tap results to people who receive water from sites that were sampled, even if lead was not detected, within 30 days of learning of results. You must also send us a certification that you met all the delivery requirements along with a sample copy of your customer notice by three months after the end of the monitoring period. To download the *Lead and Copper Report and Consumer Notice of Lead Result Certificate* in Microsoft Word or PDF format, visit http://www.michigan.gov/deq. Click on Water, Drinking Water, Community Water Supply, and Reporting Forms under the Manuals, Forms and Brochures heading. Water supplies that fail to distribute the Consumer Notice of Lead Results must include the following statement in their CCR, "During the year, we failed to provide lead results to persons served at the sites that were tested as required by the Lead and Copper Rule."

While the City's LCR compliance monitoring has continued to meet action level requirements, the LCR also requires all large systems (those serving over 50,000 people) to optimize corrosion control regardless of their 90th percentile lead concentration. One way to demonstrate fully optimized corrosion control treatment is through two consecutive six month rounds of LCR compliance monitoring in which the difference between the 90th percentile level and the highest source water lead concentration is less than the Practical Quantitative Level for lead (0.005 milligrams per liter). Since the City did not meet these criteria in both the July – December 2014, and January – June 2015, sampling periods, the City must now recommend a treatment to fully optimize corrosion control treatment within six months in accordance with requirements under Act 399, Administrative Rule 604f (R 325.10604f). **This recommendation must be provided to our office as soon as possible, but no later than January 1, 2016.**

However, given the past use of phosphate treatment by the Detroit Water and Sewerage Department (DWSD) to fully optimize corrosion control treatment when the City was a wholesale customer of DWSD, the ODWMA recommends the City select this as its recommended treatment option, and begin implementation as soon as possible to address ongoing concerns by customers regarding lead levels within their premise plumbing systems. Under the second step of this Rule, the DEQ can specify optimal corrosion control treatment.

Our office will inform you when monitoring needs to be conducted as part of the optimization of the implemented corrosion control treatment. Customer requested samples for lead shall continue to be collected and analyzed. Please make every attempt to select the same sites used in the previous monitoring period, giving Tier 1 sites first priority. If original sites are unavailable, select replacement sites based on the Tier 1, 2, and 3 criteria.

Please contact me at 517-284-6644 or rosenthala@michigan.gov at your earliest convenience to discuss how the City will be complying with the above requirements.

Sincerely,



Adam Rosenthal, Environmental Quality Analyst
Lansing District Office
Office of Drinking Water and Municipal Assistance

cc: Mr. Michael Glasgow, City of Flint

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF DRINKING WATER AND MUNICIPAL ASSISTANCE

LEAD AND COPPER REPORT AND CONSUMER NOTICE OF LEAD RESULT CERTIFICATE FOR COMMUNITY WATER SUPPLY

Issued under authority of 1976 PA 399, MCL 325.1001 *et al.*, and Administrative Rules, as amended.
Failure to submit this information is a violation of Act 399 and may subject the water supply to enforcement penalties.

Administrative Rule R 325.10710d requires water supplies to report lead and copper monitoring information within 10 days after the end of the monitoring period. This form may be used to meet this requirement. Submit the information to the appropriate Department of Environmental Quality (DEQ) district office. For district office addresses, visit www.michigan.gov/deq and click on Locations.

1. Water Supply Name: City of Flint Water Plant
2. County: Genesee 3. WSSN: **2310**
4. Population: 99,763 5. Monitoring Period: From: 1/1/15 To: 6/30/15
6. Minimum # of Samples Required: 60 7. # of Samples Taken: 69
8. Name of Certified Laboratory: DEQ Drinking Water Laboratory

9. SAMPLE CRITERIA:

Yes	No	Explain No responses in Comments block.	
☐	☒	a. Are the same sampling points used as in the previous monitoring period?	
☐	☒	b. Are all samples from Tier 1 sites?	For more information see *Instructions* paragraph 11, subparagraph "Sample Category."
☒	☐	c. Are all samples from Tier 1, 2, or 3 sites giving Tier 1 priority?	
☒	☐	d. If no Tier 1, 2, or 3 sites are available, do all sites have plumbing materials commonly found at other locations in the system?	
☒	☐	e. Is the minimum number of lead service line samples taken (when applicable)?	
Comments: Revised report after conference call with DEQ staff. Two samples were removed from list for not meeting sample criteria, and due to population the number of samples required was reduced to 60.			

10. NAME:

Name: Michael Glasgow

Title: Utilites Administrator Phone: 810-766-7135 Date: 8/20/2015

11. TAP SAMPLING DATA: (Use additional sheets as needed)

Water Supply Name/County City of Flint Water Plant WSSN 2310

RESULTS:

Sample Location	Sample Date	Sample Category[1]	Service Lines[2]	Bldg Plumb-ing[2]	Lead (ppb)	Copper (ppb)	Lab #
2205 Flusing Rd	2/15/15	1	L	C,P	N.D.	0.13	54663
1809 Stevenson St.	2/10/15	1	L	P	10	N.D.	54956
4202 Custer Ave.	3/4/15	1	L	C,P	6	0.27	56223
401 E. Newall St.	3/2/15	1	L	P	5	N.D.	56225
215 Browning Ave.	3/21/15	1	L	C,P	N.D.	0.16	56226
2615 Trumbull Ave.	2/27/15	1	L	C,P	3	N.D.	56227
201 Browning Ave.	3/5/15	1	L	P	N.D.	N.D.	56228
1224 Decker St.	3/17/15	1	L	C,P	13	0.10	57728
1220 Decker St.	3/17/15	1	L	P	4	N.D.	57730
1379 Washington Ave.	3/19/15	1	L	P	8	N.D.	57731
1383 Washington Ave.	3/19/15	1	L	C,P	6	0.17	57734
1372 Washington Ave.	3/19/15	1	L	C,P	2	0.14	57733
1367 Washington Ave.	3/17/15	1	L	P	1	N.D.	57735
1701 Marquettte Dr.	3/14/15	1	L	C,P	1	0.19	57736
778 Bundy Ave.	3/24/15	1	L	P	N.D.	N.D.	58413
3714 Beecher Rd.	3/24/15	1	L	C	2	0.52	58414
1016 Ingleside Ave.	4/9/15	1	L	C,P	7	0.07	59749
1818 Rock Creek Ln.	4/6/15	1	L	C,P	3	0.11	59750
3010 Cheyenne St.	4/3/15	1	L	C,P	5	0.10	59751
2606 Mountain Ave.	4/15/2015	1	L	P	N.D.	N.D.	60546

[1] Sample Category: Enter a number 1 through 6 to designate the category of tap sample site. For more information see *Instructions* paragraph 11, subparagraph "Sample Category."

[2] Materials used for service line and building plumbing: Enter C = copper; G = galvanized; L = lead; or P = plastic.

TO BE DETERMINED BY DEQ

	90th percentile	Ave	Max	# > AL
Pb				
Cu				

11. TAP SAMPLING DATA: (Use additional sheets as needed)

Water Supply Name/County City of Flint Water Plant WSSN 2310

RESULTS:

Sample Location	Sample Date	Sample Category[1]	Service Lines[2]	Bldg Plumb-ing[2]	Lead (ppb)	Copper (ppb)	Lab #
2020 Crooked Ln.	4/24/15	1	L	C,P	5	0.10	61845
310 E. Moore St.	4/22/15	1	L	P	5	N.D.	61846
631 Alvord Ave.	5/6/15	1	L	P	42	N.D.	63410
216 Browning Ave.	5/7/15	1	L	C,P	22	0.31	63411
3714 Beecher Rd.	5/14/15	1	L	C,P	8	0.15	64283
912 Lexington Ave.	5/15/15	1	L	P	6	N.D.	64285
349 Robbie Ln.	5/31/15	1	L	P	2	N.D.	67428
353 Robbie Ln.	5/30/15	1	L	C,P	5	0.11	67427
341 Robbie Ln.	5/31/15	1	L	C,P	3	0.05	67426
328 Robbie Ln.	5/30/15	1	L	C,P	2	0.09	67425
357 Robbie Ln.	5/31/15	1	L	C	3	0.20	67424
344 Robbie Ln.	5/31/15	1	L	C,P	4	0.11	67423
1807 Oren Ave.	6/8/15	1	L	P	21	N.D.	68023
421 Lyon St.	6/14/15	1	L	C,P	7	0.14	68788
1528 Delaware Ave.	6/12/15	1	L	P	3	N.D.	68789
3811 Brentwood Dr.	6/14/15	1	L	P	42	N.D.	68790
1615 S. Franklin Ave.	6/14/15	1	L	P	N.D.	N.D.	68791
853 E. 7th St.	6/12/15	1	L	C,P	7	0.07	68792
1150 Woodside Dr.	6/14/15	1	L	P	29	N.D.	68793
547 Copeman Blvd.	6/15/14	1	L	P	18	N.D.	68794

[1] Sample Category: Enter a number 1 through 6 to designate the category of tap sample site. For more information see *Instructions* paragraph 11, subparagraph "Sample Category."

[2] Materials used for service line and building plumbing: Enter C = copper; G = galvanized; L = lead; or P = plastic.

TO BE DETERMINED BY DEQ

	90th percentile	Ave	Max	# > AL
Pb				
Cu				

11. TAP SAMPLING DATA: (Use additional sheets as needed)

Water Supply Name/County City of Flint Water Plant WSSN 2310

RESULTS:

Sample Location	Sample Date	Sample Category[1]	Service Lines[2]	Bldg Plumb-ing[2]	Lead (ppb)	Copper (ppb)	Lab #
2114 Flushing Rd.	6/30/15	1	L	P	5	0.05	71170
709 Frost St.	6/30/15	1	L	P	2	N.D.	72033
920 Stocker Ave.	6/21/15	1	L	P	1	N.D.	69622
742 Lincoln Ave.	6/19/15	1	L	P	2	N.D.	69623
3517 Bennett Ave.	6/24/15	1	L	C,P	3	0.06	69624
1730 Overhill Dr.	6/22/15	1	L	C,P	1	0.08	69625
2117 Stanford Ave.	6/23/15	1	L	C,P	5	0.08	69626
2432 Beta Ln.	6/21/15	1	L	P	N.D.	N.D.	69627
2023 Miller Rd.	6/21/15	1	L	C,P	3	0.06	69628
721 East St. Apt #2	6/25/15	4	L	C,P	10	0.16	70222
3814 Whitter	6/25/15	1	L	P	2	N.D.	70223
3120 Norwood	6/24/15	1	L	P	5	N.D.	70224
2122 Pierce St.	6/21/15	1	L	P	2	N.D.	70225
3521 Bennett Ave.	6/25/15	1	L	P	3	N.D.	70226
1602 Raspberry Ln.	6/24/15	1	L	P	N.D.	N.D.	70227
1809 Lynbrook	6/26/15	1	L	P	3	N.D.	70228
2112 Sherff	6/24/15	1	L	C,P	9	0.06	70229
1205 Blanchard Ave.	6/24/15	1	L	C,P	11	0.05	70230
860 Schafer St.	6/26/15	1	L	C,P	N.D.	0.06	70231
2110 Flushing Rd.	6/30/15	1	L	C	N.D.	0.10	71158

[1] Sample Category: Enter a number 1 through 6 to designate the category of tap sample site. For more information see *Instructions* paragraph 11, subparagraph "Sample Category."

[2] Materials used for service line and building plumbing: Enter C = copper; G = galvanized; L = lead; or P = plastic.

TO BE DETERMINED BY DEQ

	90th percentile	Ave	Max	# > AL
Pb				
Cu				

11. TAP SAMPLING DATA: (Use additional sheets as needed)

Water Supply Name/County City of Flint Water Plant WSSN 2310

RESULTS:

Sample Location	Sample Date	Sample Category[1]	Service Lines[2]	Bldg Plumb-ing[2]	Lead (ppb)	Copper (ppb)	Lab #
2300 Flushing Rd.	6/29/15	1	L	C	3	0.28	71159
2130 Flushing Rd.	6/28/15	1	L	C,P	6	0.05	71160
2202 Flushing Rd.	6/29/15	1	L	C,P	2	0.06	71162
2429 Flushing Rd.	6/30/15	1	L	C,P	N.D.	0.06	71163
4013 Brownell Blvd.	6/29/15	1	L	C,P	2	0.08	71165
2414 Flushing Rd.	6/30/15	1	L	P	N.D.	N.D.	71166
1914 Penbrook Ln	6/29/15	1	L	P	2	N.D.	71167
3901 Leedra St.	6/26/15	1	L	P	N.D.	N.D.	71168
3142 McClure	6/26/15	1	L	P	3	N.D.	71169

[1] Sample Category: Enter a number 1 through 6 to designate the category of tap sample site. For more information see *Instructions* paragraph 11, subparagraph "Sample Category."

[2] Materials used for service line and building plumbing: Enter C = copper; G = galvanized; L = lead; or P = plastic.

TO BE DETERMINED BY DEQ

	90th percentile	Ave	Max	# > AL
Pb				
Cu				

Consumer Notice of Lead Result in Drinking Water

Water Supply Name:	City of Flint		
County:	Genesee	WSSN:	2310
Sample Location:	401 E. Newall St.	Date Sampled:	3/2/15

Thank you for participating in the lead and copper monitoring of drinking water. The levels of lead and copper found at your location are in the table below.

Key to Table	Contaminant	AL	MCLG	Your Result
Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow. **Maximum Contaminant Level Goal (MCLG):** The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety. ppb: parts per billion or micrograms per liter.	Lead (ppb)	15	0	5
	Copper (ppb)	1300	1300	Not Detected

Lead can cause serious health problems if too much enters your body from drinking water or other sources. It can cause damage to the brain and kidneys, and it can interfere with the production of red blood cells that carry oxygen to all parts of your body. The greatest risk of lead exposure is to infants, young children, and pregnant women. Scientists have linked the effects of lead on the brain with lowered IQ in children. Adults with kidney problems and high blood pressure can be affected by low levels of lead more than healthy adults. Lead is stored in the bones, and it can be released later in life. During pregnancy, the child receives lead from the mother's bones, which may affect brain development.

To reduce exposure to lead in drinking water:

- *Run your water to flush out lead.* Run the water until it becomes cold.
- *Use cold water for cooking and preparing baby formula.* Do not cook with or drink water from the hot water tap; lead dissolves more easily in hot water.
- *Do not boil water to remove lead.* Boiling water will not reduce lead levels.
- *Look for alternative sources or treatment of water.* If your lead result is above 15 ppb, you may want to consider purchasing bottled water or a water filter. Read the package to be sure the filter is approved to reduce lead or contact NSF International at 800-NSF-8010, or www.nsf.org for information on performance standards for water filters.
- *Identify if your plumbing fixtures contain lead.* New faucets, fittings, and valves, may contain up to 8 percent lead including those advertised or labeled as "lead-free" and may contribute lead to drinking water. Consumers should be aware of this when choosing fixtures and take appropriate precautions.

Although the primary sources of lead exposure for most children are deteriorating lead-based paint, lead-contaminated dust, and lead-contaminated soil, the U.S. EPA estimates that 10 to 20 percent of human exposure to lead may come from drinking water.

For more information, contact us at: City of Flint Water Plant (810) 787-6537.
For more information on reducing lead exposure around your home and the health effects of lead, visit the U.S. EPA's Web site at www.epa.gov/lead, call the National Lead Information Center at 800-424-LEAD, or contact your health care provider.

Certification: WSSN: 2310

I certify that this public water supply has provided the consumer notice of lead result to persons served at each of the taps that was tested, either by mail or by another method approved by the DEQ, within 30 days of knowing the result. The Notice includes required content.

Michael L Glasgow — Signature
UTILITIES ADMINISTRATOR — Title
3/17/15 — Date Sent to Consumer

Reminder to water supplier: Complete this certification on only one (1) example copy of a notice sent to a consumer and submit it to the DEQ.

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

KEITH CREAGH
DIRECTOR

Examining Federal Administration of the Safe Drinking Water Act in Flint, Michigan

Testimony Before the U.S. House of Representatives
Committee on Oversight and Government Reform
Michigan Department of Environmental Quality Director Keith Creagh
February 3, 2016
9:00 a.m.

Chairman Chaffetz, Ranking Member Cummings, and members of the Committee on Oversight and Government Reform, thank you for the opportunity to be here today to discuss the Flint water crisis. My name is Keith Creagh, and since January 4, 2016, I have served as Director of the Michigan Department of Environmental Quality (MDEQ).

I want to start by apologizing to the residents of Flint. In retrospect, government at all levels should have done more. We must fully investigate what happened in order to make sure it will never happen again. In addition, and most urgently, we must fix the problem for the people of Flint.

This is a complex issue due, in part, to the multiple levels of government oversight. The City of Flint (the City) is responsible for the daily operations of the water plant and the distribution system, including identifying sampling locations, collecting samples, and certifying that the samples meet the criteria of the Lead and Copper Rule. The State of Michigan (the State) is responsible for ensuring compliance with the Lead and Copper Rule and Safe Drinking Water Act. The U.S. Environmental Protection Agency (EPA) sets national drinking water standards, provides oversight to make sure those standards are met, and audits the State's program.

In Flint, as the City switched its water source without proper corrosion treatment, no entity focused on the structure and analysis enough to understand the possible implications. The City did not fully implement its water utility consultant's recommendations. In addition, the Lead and Copper Rule required the City to assure all sampling protocols were followed, including sampling from homes that had lead services and certifying those results with the State. It has been reported that the City has admitted that its staff certified results that did not meet the criteria.

IN FLINT

Second, the implementation of the federal Lead and Copper Rule was ineffective in protecting public health. When the first round of lead sampling came back at 6 parts per billion in January 2015, corrosion treatment was not implemented. Regardless of the testing schedule allowed by the EPA rule, in hindsight, when the lead levels began to rise, corrosion treatment should have been required by the MDEQ. As the Michigan Auditor General pointed out, the MDEQ's Office of Drinking Water and Municipal Assistance relied on technical compliance instead of assuring safe drinking water. It is noteworthy that the Lead and Copper Rule would have allowed up to 24 months to begin these treatments. It has now become clear that the federal Lead and Copper Rule is outdated and inadequate to protect the public from exposure to lead, especially in communities with aging infrastructure, such as Flint.

From the time of the switch to the Flint River as the primary water source in 2014, until the MDEQ received the January 21, 2016, Emergency Administrative Order (the Order)

from the EPA, my observation is that the EPA did not display the sense of urgency that the situation demanded. This is underscored by the conversations started in February 2015 regarding implementation of the federal Lead and Copper Rule. Between February and the end of September 2015, there were multiple e-mail exchanges and conference calls between the MDEQ and EPA. Yet when the parties were unable to come to consensus on its implementation in July 2015, the EPA failed to provide the legal opinion requested by the MDEQ until November 2015.

Furthermore, after being provided a copy of Miguel Del Toral's June 24, 2015, memo on high lead levels in Flint by a third party, the MDEQ was notified by an EPA official in an e-mail that:

> *I wanted to remind you that Miguel's report had DEQ cc'd. So if the Legislature or who ever (sic) might say you all were cc'd, you can truthfully respond that it was EPA's request that the report not be sent to the cc's. Consequently, you all never received the report from Miguel.*

The MDEQ eventually received the memo from the EPA in November 2015, after it had already begun actions to address the lead problem. Legitimate concerns raised by EPA's own expert staff were not elevated or provided to either the City or the State for review and action until after the State's response was well underway.

When government finally responded to the public outcry, thanks to the relentless efforts of independent scientists whose warnings turned out to be correct – our tone was combative and dismissive. None of the levels of government communicated effectively with the public.

I am confident that the many reviews of this situation, from the U.S. Department of Justice to interagency teams, will address in-depth the policy and decision-making corrections needed to ensure that government at all levels can provide safe, clean drinking water to citizens.

While we could spend this whole morning trying to assign blame, I would first like to acknowledge the unwavering advocacy of EPA's Miguel Del Toral, Dr. Marc Edwards, and Dr. Mona Hanna-Attisha in helping to bring this problem to light. And I would like to spend the final few minutes discussing the coordinated State response that has been undertaken to fix this problem.

KEEP

On October 2, 2015, Governor Snyder announced a 10-step plan to address the Flint water emergency. The initial steps included switching back to water provided by the Detroit Water and Sewerage Department (DWSD), which occurred on October 16, 2015. Supplemental phosphates were added to the treated DWSD water to provide additional protection on the lead service lines on December 9, 2015. All of Flint's public schools facilities have been evaluated, and problem fixtures are being remedied. In the

public schools, teams of plumbers were able to identify the issue was not lead service lines, but instead individual drinking water fixtures that contained lead.

The Governor announced the activation of the State Emergency Operations Center on January 5, 2016, just one day after Genesee County declared a state of emergency. Since the end of January, we have handed out approximately:

100,000 Water filters

234,000 Cases of bottled water

32,000 Water testing sampling kits

The State has been working hard to develop effective and responsive steps to address issues related to drinking water in Flint. SENTENCE FROM PREVIOUS PAGE There are more than I have addressed in my opening remarks, but I do want to highlight the State's five-prong sampling plan that addresses both the short-term and long-term needs of Flint. This approach includes the following:

1. Access to water sampling for all residents. Although this is not a scientific sampling pool, initial results have shown lead levels in the water with 93 percent of sampling of homes below the actionable level of 15 parts per billion.
2. Testing of additional schools, daycares, and nursing homes is underway.
3. Assessment of food establishment through the Michigan Department of Agriculture and Rural Development is occurring.

4. Home screening and additional follow up for children with elevated lead levels in their blood are being coordinated by the Michigan Department of Health and Human Services. And,
5. Identification of sentinel sites is occurring to allow for long-term monitoring and testing of the water, in conjunction with the EPA and the City.

The State has also enlisted the expertise of Dr. Marc Edwards and Dr. Mona Hanna-Attisha, among others, as advisors on Michigan's Flint Water Interagency Coordinating Committee to work on long-term water infrastructure solutions for Flint. Through this partnership, and the work of the EPA's Flint Safe Drinking Water Task Force, the City, State, and federal government will work in unison to provide safe drinking water to the residents of Flint. This partnership will ensure that testing and monitoring is validated by trusted third parties. Much of the work produced by these committees can be used as blueprints for other communities.

The State will achieve the deliverables identified in the EPA Order sent on January 21. Since the issuance of the Order, the State and EPA have had productive and constructive conversations on a unified path forward. While we certainly appreciate the dialogue that has occurred, consultation with the State before the Order was issued would have provided clarity to many of the issues that the State was already underway in addressing. Indeed, it is puzzling that the Order was issued so long after the response efforts began, and without mentioning the steps that were already underway.

I recognize the problem with finger pointing is that it makes it difficult to work in tandem to solve real problems for real people depending on us. To be successful, we, the State, need to have a high performing, trust-based partnership with the EPA, the City, and other agencies at local and county levels. Learning from the Flint situation and talking about it will not be easy, especially in a political environment. I appreciate the relationships that have been established between myself, Mayor Weaver, and interim EPA Regional Administrator Bob Kaplan through our weekly calls and meetings with the EPA and meetings with the City.

We know the task ahead is important, as is the restoration of the public's trust. However, Governor Snyder is committed to providing the resources necessary to provide solutions. I look to our Congressional and federal partners to also provide leadership on federal resources that can be leveraged to address the problems related to the Flint water system. We will not rest until this problem is solved and the people of Flint are assured that they again have water that is safe for them and their families

I thank you again for the opportunity to come before you today and look forward to answering any questions you may have.

JONATHAN
Jim

1) TELL TRUTH
2) ANSWER QUESTION THAT IS ASKED
3) REFORMULATE QUESTIONS IF NECESSARY
4) BE SURE YOU UNDERSTAND QUESTION
5) KEEP ANSWERS TO 4-6 SENTENCES

JONATHAN
(847) 682 4507

WHY WAS LEE DER SO AGGRESSIVELY DISMISSIVE OF THE VERY EXPERTS THAT IDENTIFIED THIS ISSUE

YOU STATED EVERYONE DESERVES SAFE CLEAN DRINKING WATER
WHEN ARE YOU GOING TO ADDRESS THE OTHER URBAN AREAS THAT FACE THIS PROBLEM

CORE TESTIMONY

- GAP IN REGS COVERING THIS SITUATION
  - PERMITTING PROCESS DOESN'T COVER
- INCORRECT UNDERSTANDING EPA WASN'T CLEAR
- WE HAVE A PLAN GOING FORWARD
- I'M HERE TO TELL YOU WHAT WE ARE GOING TO DO FOR THE CITIZENS OF FLINT

City of Flint Water
Action Steps for Week of October 26-30

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Conduct After Action Plan	DEQ	George Krisztian	Initial meeting held 10/22/15
2.	Introduce legislative changes to Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone George Krisztian Sonya Butler	Draft language submitted to Maggie Pallone for review
3.	After Action Review Panel	DEQ	Madhu Anderson George Krisztian Karen Tommasulo	Panel created and press release issued on 10/21/15
4.	Staff hiring plan	DEQ	Jim Sygo Maggie Pallone George Krisztian	
5.	Finalize fiscal year 2017 budget request	DEQ	Maggie Pallone George Krisztian	
6.	Meeting(s) with school staff/management	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	A meeting with the 10 remaining schools is tentatively scheduled for the week of 10/26/15
7.	Meet with DHHS and discuss all lead education material for schools	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	DEQ has contacted DHHS to schedule a meeting Need dates for mtg/s
8.	Review corrosion control treatment plan and get any EPA comments	DEQ and EPA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Summary of Flint's corrosion control plan submitted to EPA
9.	Review construction permit application and issue construction permit for phosphate equipment	DEQ	Jim Sygo Steve Busch Pat Cook	Additional discussions are in progress with city of Flint Meeting need to be arranged to discuss mtg/s

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE
October 26, 2015

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
			Mike Prysby	
10.	Review Standby Operation of Flint Water Treatment Plant with city of Flint	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Comments by DEQ to city of Flint have been provided
11.	Work with Karegnondi Water Authority (KWA) and other agencies to address bottleneck issues. Check weekly for status update.	DEQ and KWA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Issues regarding soil erosion controls during construction are being addressed
12.	Contact city of Flint for Service Line Record status update and obtain a copy of the records to date	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Need list Records Received and Ready for Review by DEQ staff
13.	Provide DHHS with any available cross-reference information	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
14.	Develop childcare facility guidance or review DHHS related materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	DEQ has contacted DHHS to schedule a meeting
15.	Create a generic school sampling guidance document for statewide distribution. Target audience: schools served by municipal water.	DEQ and LARA	Jim Sygo Steve Busch Richard Benzie	
16.	Confirm plumbing assessment and sampling is scheduled for Brownell K-2 STEM Academy and Eisenhower Elementary.	DEQ and LARA	Jim Sygo Steve Busch Mike Prysby	Trainer Scheduled for 10/15

Department of Environmental Quality
Cost Estimates for Testing Drinking Water in Michigan Schools
December 21, 2015

Cost Per School

Sample Costs		
Cost per Sample	$	28
Average Number of Samples Needed per School		250
Sample Costs	$	7,000
Labor Costs		
Plumbing Evaluation (two people needed for one day)	$	1,120
Sampling Staff (four people needed for one day)	$	2,240
Labor Costs	$	3,360
Average Cost per School	$	10,360

Statewide Cost

Number of Public, Charter, and Private School Buildings in Michigan	7,900
Estimated Cost to Test All Michigan Schools	$81,844,000

Fixture replacement ~ $400.00 / fixture
Average # of fixtures to replace / school (25)
Average Cost of fixture replacement / school $10,000.00
Number of Schools in Michigan $7,900.00
Total Cost $79,000,000.00

City of Flint Water
Action Steps for Week of October 19-23

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Update 2004 letter to EPA	DEQ	Dana DeBruyn	This Action Step has been incorporated as part of the After Action Plan (Action Step #4)
2.	Schedule Flint Water Treatment Plant tour	DEQ and Flint	George Krisztian	Scheduled for 10/23/15 at 11:30 a.m.
3.	Figure out number of samples from schools and child care facilities	DEQ	Jim Sygo Pat Cook Steve Busch	1,300 samples (13 schools and 100 samples per school)
4.	Conduct After Action Plan	DEQ	George Krisztian	Initial meeting held 10/22/15
5.	Introduce legislative changes to Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone George Krisztian Sonya Butler	Draft language submitted to Maggie Pallone for review
6.	After Action Review Panel	DEQ	Madhu Anderson George Krisztian Karen Tommasulo	Panel created and press release issued on 10/21/15
7.	Staff hiring plan	DEQ	Jim Sygo Maggie Pallone George Krisztian	
8.	$1 million for DEQ Laboratory billing code	DEQ	Maggie Pallone George Krisztian	Billing codes created on 10/21/15
9.	Finalize fiscal year 2017 budget request	DEQ	Maggie Pallone George Krisztian	

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
10.	Develop letter to schools	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	This Action Step has been incorporated into Action Step #13
11.	Finalize sampling protocol	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	Held conference call on 10/22/15 with EPA's Flint Safe Drinking Water Task Force to clarify questions on sampling protocol
12.	Confirm school sampling logistics	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	Logistics have been finalized for the initial sampling scheduled for 10/24/15
13.	Meeting(s) with school staff/management	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	A meeting with the 10 remaining schools is tentatively scheduled for the week of 10/26/15
14.	Meet with DHHS and discuss all lead education material for schools	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	DEQ has contacted DHHS to schedule a meeting
15.	ODWMA staff observe a DLARA plumbing assessment	DEQ and DLARA	Steve Busch Pat Cook Mike Prysby	Initial plumbing assessment is scheduled for 10/23/15; sampling to occur on 10/24/15
16.	Develop sample form and chain of custody document	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	DEQ Laboratory has created a fillable PDF form for use in the school sampling protocol

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
17.	Review corrosion control treatment plan and get any EPA comments	DEQ and EPA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Summary of Flint's corrosion control plan submitted to EPA
18.	Review construction permit application and issue construction permit for phosphate equipment	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	Construction permit is in process; proper phosphate dosages confirmed, based on incoming residual to Flint
19.	Review Standby Operation of Flint Water Treatment Plant with city of Flint	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	
20.	Provide city of Flint updated monitoring schedule based on Detroit Water and Sewerage Department (DWSD)/Great Lakes Water Authority (GLWA) service	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Updated monitoring schedule has been completed and signed
21.	Contact city of Flint and Genesee County Health Department daily for DWSD connection status updates	DEQ, Flint, and Genesee County Health Department	Jim Sygo Steve Busch Pat Cook Mike Prysby	Switch to DWSD completed on 10/16/15; city of Flint will let DEQ know if they run into any unforeseen issues
22.	Work with Karegnondi Water Authority (KWA) and other agencies to address bottleneck issues	DEQ and KWA	Jim Sygo Steve Busch Pat Cook Mike Prysby	E-mail sent to Genesee County regarding concerns over soil erosion control measures
23.	Verify city of Flint distribution operations under DWSD/GLWA service	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
24.	Contact city of Flint for Service Line Record status update and obtain a copy of the records to date	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	
25.	Provide DHHS with any available cross-reference information	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
26.	Develop childcare facility guidance or review DHHS related materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	DEQ has contacted DHHS to schedule a meeting

ANALYTE	RESULT (mg\L)	Sample Location	Sample Description	Site Code	Site Code Description
Lead	0.010	Classroom 12	CF022	P1	First Primary draw of 125 milliliters
Lead	0.003	Classroom 12	CF022	P2	Second Primary draw of 125 milliliters
Lead	0.001	Classroom 12	CF022	F01	Flush Sample taken 30 Seconds after Second
Lead	0.001	Classroom 12	CF022	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.004	Classroom 12	CF021	P1	First Primary draw of 125 milliliters
Lead	0.007	Classroom 12	CF021	P2	Second Primary draw of 125 milliliters
Lead	0.000	Classroom 12	CF021	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 12	CF021	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.009	Classroom 5	CF009	P1	First Primary draw of 125 milliliters
Lead	0.002	Classroom 5	CF009	P2	Second Primary draw of 125 milliliters
Lead	0.002	Classroom 5	CF009	F01	Flush Sample taken 30 Seconds after Second
Lead	0.001	Classroom 5	CF009	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.102	Classroom 11	CF015	P1	First Primary draw of 125 milliliters
Lead	0.026	Classroom 11	CF015	P2	Second Primary draw of 125 milliliters
Lead	0.014	Classroom 11	CF015	F01	Flush Sample taken 30 Seconds after Second
Lead	0.011	Classroom 11	CF015	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.003	Classroom 11	CF016	P1	First Primary draw of 125 milliliters
Lead	0.003	Classroom 11	CF016	P2	Second Primary draw of 125 milliliters
Lead	0.005	Classroom 11	CF016	F01	Flush Sample taken 30 Seconds after Second
Lead	0.004	Classroom 11	CF016	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.009	Classroom 21	CF027	P1	First Primary draw of 125 milliliters
Lead	0.007	Classroom 21	CF027	P2	Second Primary draw of 125 milliliters
Lead	0.000	Classroom 21	CF027	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 21	CF027	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.012	Classroom 6	CF010	P1	First Primary draw of 125 milliliters
Lead	0.004	Classroom 6	CF010	P2	Second Primary draw of 125 milliliters
Lead	0.002	Classroom 6	CF010	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 6	CF010	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.009	Classroom 21	CF028	P1	First Primary draw of 125 milliliters
Lead	0.002	Classroom 21	CF028	P2	Second Primary draw of 125 milliliters
Lead	0.001	Classroom 21	CF028	F01	Flush Sample taken 30 Seconds after Second
Lead	0.001	Classroom 21	CF028	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.023	Classroom 19	CF024	P1	First Primary draw of 125 milliliters
Lead	0.003	Classroom 19	CF024	P2	Second Primary draw of 125 milliliters
Lead	0.004	Classroom 19	CF024	F01	Flush Sample taken 30 Seconds after Second
Lead	0.003	Classroom 19	CF024	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.005	Community Room	KC003	P1	First Primary draw of 125 milliliters
Lead	0.002	Community Room	KC003	P2	Second Primary draw of 125 milliliters
Lead	0.000	Community Room	KC003	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Community Room	KC003	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.009	Classroom 19	CF023	P1	First Primary draw of 125 milliliters
Lead	0.009	Classroom 19	CF023	P2	Second Primary draw of 125 milliliters
Lead	0.001	Classroom 19	CF023	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 19	CF023	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.015	Hallway	DW002	P1	First Primary draw of 125 milliliters
Lead	0.006	Hallway	DW002	P2	Second Primary draw of 125 milliliters
Lead	0.004	Hallway	DW002	F01	Flush Sample taken 30 Seconds after Second
Lead	0.001	Hallway	DW002	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.002	Classroom 9	CF012	P1	First Primary draw of 125 milliliters
Lead	0.004	Classroom 9	CF012	P2	Second Primary draw of 125 milliliters
Lead	0.002	Classroom 9	CF012	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 9	CF012	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.040	Hallway	DW001	P1	First Primary draw of 125 milliliters
Lead	0.006	Hallway	DW001	P2	Second Primary draw of 125 milliliters
Lead	0.004	Hallway	DW001	F01	Flush Sample taken 30 Seconds after Second
Lead	0.001	Hallway	DW001	F02	Flush Sample taken 2 minutes after First Flush

ANALYTE	RESULT (mg\L)	Sample Location	Sample Description	Site Code	Site Code Description
Lead	0.014	Classroom 15	CF018	P1	First Primary draw of 125 milliliters
Lead	0.005	Classroom 15	CF018	P2	Second Primary draw of 125 milliliters
Lead	0.002	Classroom 15	CF018	F01	Flush Sample taken 30 Seconds after Second
Lead	0.002	Classroom 15	CF018	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.010	Classroom 15	CF017	P1	First Primary draw of 125 milliliters
Lead	0.014	Classroom 15	CF017	P2	Second Primary draw of 125 milliliters
Lead	0.002	Classroom 15	CF017	F01	Flush Sample taken 30 Seconds after Second
Lead	0.002	Classroom 15	CF017	F02	Flush Sample taken 2 minutes after First Flush
Lead	[illegible]	DHHS Office	CF029	P1	First Primary draw of 125 milliliters
Lead	0.012	DHHS Office	CF029	P2	Second Primary draw of 125 milliliters
Lead	0.002	DHHS Office	CF029	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	DHHS Office	CF029	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.013	Classroom 4	CF008	P1	First Primary draw of 125 milliliters
Lead	0.006	Classroom 4	CF008	P2	Second Primary draw of 125 milliliters
Lead	0.001	Classroom 4	CF008	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 4	CF008	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.007	Classroom 3	CF007	P1	First Primary draw of 125 milliliters
Lead	0.006	Classroom 3	CF007	P2	Second Primary draw of 125 milliliters
Lead	0.003	Classroom 3	CF007	F01	Flush Sample taken 30 Seconds after Second
Lead	0.002	Classroom 3	CF007	F02	Flush Sample taken 2 minutes after First Flush
Lead	[illegible]	Classroom 10	CF014	P1	First Primary draw of 125 milliliters
Lead	0.007	Classroom 10	CF014	P2	Second Primary draw of 125 milliliters
Lead	0.004	Classroom 10	CF014	F01	Flush Sample taken 30 Seconds after Second
Lead	0.003	Classroom 10	CF014	F02	Flush Sample taken 2 minutes after First Flush
Lead	[illegible]	Classroom 14	CF026	P1	First Primary draw of 125 milliliters
Lead	[illegible]	Classroom 14	CF026	P2	Second Primary draw of 125 milliliters
Lead	[illegible]	Classroom 14	CF026	F01	Flush Sample taken 30 Seconds after Second
Lead	0.004	Classroom 14	CF026	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.005	Classroom 17	CF019	P1	First Primary draw of 125 milliliters
Lead	0.003	Classroom 17	CF019	P2	Second Primary draw of 125 milliliters
Lead	0.001	Classroom 17	CF019	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 17	CF019	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.000	Classroom 14	CF025	P1	First Primary draw of 125 milliliters
Lead	0.003	Classroom 14	CF025	P2	Second Primary draw of 125 milliliters
Lead	0.003	Classroom 14	CF025	F01	Flush Sample taken 30 Seconds after Second
Lead	0.002	Classroom 14	CF025	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.009	Classroom 10	CF013	P1	First Primary draw of 125 milliliters
Lead	[illegible]	Classroom 10	CF013	P2	Second Primary draw of 125 milliliters
Lead	0.003	Classroom 10	CF013	F01	Flush Sample taken 30 Seconds after Second
Lead	0.003	Classroom 10	CF013	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.013	Classroom 17	CF020	P1	First Primary draw of 125 milliliters
Lead	0.004	Classroom 17	CF020	P2	Second Primary draw of 125 milliliters
Lead	0.005	Classroom 17	CF020	F01	Flush Sample taken 30 Seconds after Second
Lead	0.003	Classroom 17	CF020	F02	Flush Sample taken 2 minutes after First Flush
Lead	[illegible]	Classroom 2	CF006	P1	First Primary draw of 125 milliliters
Lead	0.003	Classroom 2	CF006	P2	Second Primary draw of 125 milliliters
Lead	0.001	Classroom 2	CF006	F01	Flush Sample taken 30 Seconds after Second
Lead	0.001	Classroom 2	CF006	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.002	Classroom 7	CF011	P1	First Primary draw of 125 milliliters
Lead	0.000	Classroom 7	CF011	P2	Second Primary draw of 125 milliliters
Lead	0.002	Classroom 7	CF011	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Classroom 7	CF011	F02	Flush Sample taken 2 minutes after First Flush
Lead	[illegible]	Proposed Pre K	CF031	P1	First Primary draw of 125 milliliters
Lead	0.003	Proposed Pre K	CF031	P2	Second Primary draw of 125 milliliters
Lead	0.002	Proposed Pre K	CF031	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Proposed Pre K	CF031	F02	Flush Sample taken 2 minutes after First Flush

ANALYTE	RESULT (mg\L)	Sample Location	Sample Description	Site Code	Site Code Description
Lead	0.010	Proposed Pre K	CF030	P1	First Primary draw of 125 milliliters
Lead	0.003	Proposed Pre K	CF030	P2	Second Primary draw of 125 milliliters
Lead	0.007	Proposed Pre K	CF030	F01	Flush Sample taken 30 Seconds after Second
Lead	0.000	Proposed Pre K	CF030	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.012	Classroom 1	CF004	P1	First Primary draw of 125 milliliters
Lead	0.007	Classroom 1	CF004	P2	Second Primary draw of 125 milliliters
Lead	0.004	Classroom 1	CF004	F01	Flush Sample taken 30 Seconds after Second
Lead	0.002	Classroom 1	CF004	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.005	Classroom 1	DW005	P1	First Primary draw of 125 milliliters
Lead	0.003	Classroom 1	DW005	P2	Second Primary draw of 125 milliliters
Lead	0.003	Classroom 1	DW005	F01	Flush Sample taken 30 Seconds after Second
Lead	0.002	Classroom 1	DW005	F02	Flush Sample taken 2 minutes after First Flush
Lead	0.002	Proposed Pre K	CF030	CA1	First Sequential Sample
Lead	0.001	Proposed Pre K	CF030	CA2	Second Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA3	Third Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA4	Forth Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA5	Fifth Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA6	Sixth Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA7	Seventh Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA8	Eigth Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA9	Ninth Sequential Sample
Lead	0.000	Proposed Pre K	CF030	CA10	Tenth Sequential Sample
Lead	[illegible]	Classroom 11	CF015	CB1	First Sequential Sample
Lead	0.008	Classroom 11	CF015	CB2	Second Sequential Sample
Lead	0.008	Classroom 11	CF015	CB3	Third Sequential Sample
Lead	0.007	Classroom 11	CF015	CB4	Forth Sequential Sample
Lead	0.007	Classroom 11	CF015	CB5	Fifth Sequential Sample
Lead	0.007	Classroom 11	CF015	CB6	Sixth Sequential Sample
Lead	0.007	Classroom 11	CF015	CB7	Seventh Sequential Sample
Lead	0.006	Classroom 11	CF015	CB8	Eigth Sequential Sample
Lead	0.006	Classroom 11	CF015	CB9	Ninth Sequential Sample
Lead	0.006	Classroom 11	CF015	CB10	Tenth Sequential Sample
Lead	0.002	Classroom 21	CF027	CC1	First Sequential Sample
Lead	0.000	Classroom 21	CF027	CC2	Second Sequential Sample
Lead	0.000	Classroom 21	CF027	CC3	Third Sequential Sample
Lead	0.000	Classroom 21	CF027	CC4	Forth Sequential Sample
Lead	0.000	Classroom 21	CF027	CC5	Fifth Sequential Sample
Lead	0.000	Classroom 21	CF027	CC6	Sixth Sequential Sample
Lead	0.000	Classroom 21	CF027	CC7	Seventh Sequential Sample
Lead	0.000	Classroom 21	CF027	CC8	Eigth Sequential Sample
Lead	0.000	Classroom 21	CF027	CC9	Ninth Sequential Sample
Lead	0.000	Classroom 21	CF027	CC10	Tenth Sequential Sample

Note: Results of "Not Detected" have been converted to a numerical value of zero to allow for ease of sorting

Results in RED exceed 15 ppb
1 ppb = 0.001 mg\L

Flint Water FY 2016 Supplemental Budget Request

1. $1 Million for Filters

The $1 million for filters will be used to purchase filters for households in Flint that do not qualify for assistance under any of the DHHS assistance programs. Filters for those residents will be paid for out of funding already in place in DHHS' budget. Each filter is $20 and they were ordered in bulk through Home Depot. Filters are being distributed through local public health departments, with documentation filed for each filter handed out.

2. $6 Million for switch from Flint River to DWSD

The City of Flint estimates it will cost the City an additional $1.3 million per month to use DWSD instead of the Flint River. The State and the City agreed to split the cost through June 2016, when the new Karegnondi Water Authority will be completed and Flint will switch to that water source. ($1.3 million for 9 months)

3. $1.35 Million for resources to do community Lead Exposure Testing

DEQ, DHHS and LARA are assembling a team to go into schools, childcare facilities, and other high lead exposure health risk locations to test and follow up on lead exposure.

4. $1 Million for evaluating sample results at the State Lab

The new testing protocols for schools will require each faucet in the school to be tested and evaluated at the State lab. In addition, lead exposure testing in homes will result in tens of thousands more samples that will be need to processed. Each sample costs $26 to process.

Total Ask: $9.35 Million, $7.15 GF

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Total Ask: $9.35 Million, $7.15 GF

Summary of the Flint Water Issue

Prior to 1967 the city of Flint utilized the Flint River as the primary source for the Water Treatment Plant (WTP)

The city then switched to the Detroit Water and Sewer Department (DWSD) as the primary source for drinking water. The water supplied by DWSD was finished water and went directly to the city of Flint's distribution system.

The city of Flint maintained the Flint River as an emergency backup. The city ran the WTP on a quarterly basis to maintain operational capabilities. Testing of the water at the plant did not reveal any issues with respect to meeting the water quality standards of the Safe Drinking Water Act (SDWA).

In January of 2006 initial discussions began regarding the creation of the Keregnondi Water Authority (KWA)

In April of 2013 Flint notified the DWSD of their intent to join the Karegnondi Water Authority. In response the DWSD set a termination date of April 17, 2014.

Since there was not enough time for KWA to come online before the termination date, the city of Flint notified the DEQ of their intent to use the Flint River as the primary source of water until the KWA went online. In May of 2014 the city of Flint began using the Flint River as the primary source for drinking water.

In August and September of 2014 the city issued localized boil water notices based on bacteriological testing results.

During Late 2014 and early 2015 the city of Flint experienced disinfection byproduct violations. In response, the city implemented the use of Granular Activated Carbon filtration in order to address the issue.

Based on an interpretation of the lead and copper rule, DEQ staff instructed the city of Flint to conduct two consecutive 6 month rounds of testing to demonstrate acceptable corrosion control in lieu of having the city implement corrosion control treatment immediately. The first 6 month round of testing showed a 90th percentile value of 6 ppb the second 6 month round of testing yielded a 90th percentile value of 11 ppb. In response to these results DEQ staff instructed the city of Flint to implement corrosion control treatment.

After the City of Flint switched over to the Flint River, there was an increase in the number of complaints from residents regarding color, order and taste issues with the water. As a result of these complaints researchers from Virginia Tech came to investigate and found elevated levels of lead in the water. Concurrent to that investigation, researchers at Hurley Medical Center found an increase in the incidence of Elevated Blood Lead Levels in young children. The researchers at Hurley then

correlated the increase in blood lead levels with the increase in lead in drinking water that occurred subsequent to the switch to the Flint River as the drinking water source.

On September 25, 2015 the city of Flint issued a lead advisory regarding drinking water. A week later the State Chief Medical Officer confirmed the Hurley findings and the Genesee County Health Department issued a "Do Not Drink" advisory.

On October 2, 2015 the GCHD in conjunction with the DEQ did preliminary screening of the facilities in the Flint Community Schools System. The results of this screening showed that there were lead issues in the schools that required further investigation. The schools were instructed to cease use of drinking fountains and faucets for consumptive purposes while a more detailed investigation could be conducted.

On October 16, 2015 the city of Flint switched back to using water from DWSD as their source. Due to the use of the Flint River water the city was instructed to implement supplemental phosphate addition to assist in rebuilding the protective layer in the distribution system. On December 9, 2015 the city finished installing the equipment and supplemental phosphate addition began.

On October 24, 2015 the DEQ in conjunction with LARA began conducting plumbing evaluations of the Flint Community Schools. The results so far show that although the primary source of lead leaching into the water is coming from fixtures such as faucets and fountain heads, the results are in some cases very concerning with values exceeding 100 ppb. On December 29, 2015 the last of the Flint Community Schools were sampled and the results are pending. The results of these plumbing evaluations show that a significant portion of the fixtures will need to be replaced in order to bring the lead concentrations in the water down below the EPA Action level of 15 ppb.

The primary sources of lead contamination in the Flint water supply comes from older fixtures, older solder used for copper pipes in the homes and lead service lines. Lead service lines that have had the protective coating stripped away can contribute very high levels of lead. In addition, construction near to lead service lines can also cause particulate lead to dislodge and potentially be consumed. Even with optimized corrosion controls in place, these sources of lead can still leach into the water. The use of corrosion control simply slows but does not arrest the leaching process.

Due to these reasons, the lead service lines in the city of Flint need to be replaced. A program for lead line replacement should be implemented and should be done in concert with other infrastructure projects where feasible. Homes with children that have elevated blood lead levels need to be given top priority and then a system devised to address the order of lead service line replacement. In the interim residents should continue the use of filtration devices and other measures should be developed to help minimize the exposure to lead.

Current estimates are that there are approximately 15,000 lead service lines in the city of Flint. The replacement of all of the lines is not feasible in one year and a schedule

Busch, Stephen (DEQ)

From: Busch, Stephen (DEQ)
Sent: Friday, May 01, 2015 2:38 PM
To: Ann Newell (AnnNewell@hurleymc.com)
Subject: Water Safety Plan/HACCP Information
Attachments: WHO-LegionellaAndPreventionOfLegionellosis-2007.pdf; WHO-WaterSafetyInBuildings-2011.pdf; EPA Small Systems Webinar Series_April 28_2015.pdf; VHA Directive 1061 - Prevention of Healthcare associated Legionella 8-2....pdf

Ann,

As promised I am providing additional information regarding Water Safety Plans and Hazard Analysis Critical Control Points (HACCP) system.

Attached are two documents from the World Health Organization regarding Legionella and the development of water safety plans. Both have information specific to health care facilities. Also attached is the latest VHA directive to their facilities regarding protocols for the prevention of legionella. And the last attachment is from an EPA webinar earlier this week regarding Healthcare water systems. The later portion of this document contains information regarding various treatment systems.

The video linked below reviews the HACCP/Water Safety Plan process steps. *(Best Practices in Preventing Disease From Waterborne Pathogens in Healthcare Water Systems):*
https://youtu.be/LHqU2YSaag0

The basic Implementation Protocol is as follows:

1. Establish an HACCP team (responsible and accountable)
2. Describe the water system(s)
3. Develop the process flow diagrams
4. Confirm process flow diagrams with onsite audits
5. Perform systematic hazard analysis and risk characterization
6. Determine critical control points
7. Establish critical control limits (quantitative parameters)
8. Monitoring Methods and Frequencies
9. Develop Corrective Actions
10. Verification of HACCP implementation
11. Verification of hazard control
12. Documentation, communication, and recordkeeping

Al Kubly, Section Head of Facilities Operations, Mayo Clinic, would be an excellent contact on how to develop your water safety plan/HACCP. He chair's their Water Management Team that is implementing the Mayo Clinic's Potable Water Quality Program, which he spoke about at a recent conference. The Clinic phone number in Rochester, MN is 507-284-2511.

As noted in the EPA presentation and as we have previously discussed, should your facility decide to install water treatment equipment, it may constitute a public water system triggering requirements under the safe drinking water act. Our office would need to permit any such treatment equipment prior to installation and use.

Please let me know if you are in need of any further assistance or have any questions regarding these matters.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

Drinking Water Regulations for Monitoring of Lead in Schools and Child Care Centers

There is no federal or Michigan law requiring sampling of drinking water in schools that receive water from other public water systems, although schools that have their own water supply are subject to regulation and sampling as non-community public water systems. Schools served by a public water system may be included as a sampling site (i.e., tap) for a public water system's lead and copper monitoring program if there are insufficient single-family homes that qualify. There are no federal requirements for more extensive testing.

The 1986 Amendments to the Safe Drinking Water Act (SDWA) required EPA to develop regulations to control for lead in drinking water. The Lead and Copper Rule (LCR), issued in 1991, is focused on controlling corrosion within the distribution system that delivers water to customers. The 1986 SDWA Amendments also required that only lead-free materials be used in new plumbing and in plumbing repairs.

In 1988, the SDWA was further amended by the Lead Contamination Control Act (LCCA), to reduce the exposure of lead to children in schools and child care facilities. The LCCA prohibited the sale of any drinking water cooler that is not lead-free and required that:
- the EPA identify each brand and model of drinking water cooler, indicating which are lead free and which have a lead-lined tank and distribute the list to states (SDWA Sec. 1463),
- the Consumer Product Safety Commission order that manufacturers and importers of all drinking water coolers identified as having a lead-lined tank repair, replace, or recall and provide a refund for such coolers (SDWA Sec. 1462),
- the EPA publish a guidance document and testing protocol to assist states in determining the source and degree of lead contamination in school drinking water (SDWA Sec. 1464), and
- states establish programs to assist schools and child care facilities to test for and remedy lead contamination problems, with public availability of results of such testing (SDWA Sec. 1464(d)).

As a result of a 1996 court decision, States are not required to establish testing programs. In its decision, the Fifth Circuit held that provisions in section 1464(d) were unconstitutional under the Tenth Amendment to the U.S. Constitution because they directly compelled the state to enact and enforce a federal regulatory program and provided no options for the State to decline the program. The decision did not, however, restrict states from developing and carrying out their own programs to assist schools.

In 1989 and subsequent years, EPA released guidance and information to inform states and school systems how to test for and reduce the risk of lead exposure in school drinking water. EPA's guidance provides a protocol for testing water in schools and recommends that schools take action at fixtures where the lead concentration exceeds 20 ppb. This concentration differs from the 15 ppb action level that public water systems are required to follow. ***The 20 ppb action level is based on a smaller sample collection volume of 250 milliliters (ml) and is designed to pinpoint specific fountains and outlets that require attention.***

In 1990, Michigan did provide schools and licensed child care centers with information to assist in testing and remedying potential lead contamination of their drinking water as required by the Lead Contamination Control Act of 1988. This information included a sampling protocol and guidance on flushing their system to minimize lead exposure.

In 2004, EPA surveyed states to determine what additional programs may exist to control exposure to lead in drinking water at schools and child care centers. Forty-nine states, Puerto Rico, the District of Columbia and the Navajo Nation responded. Only 16 respondents indicated they have or will conduct special sampling or studies to target lead exposure at schools and child care centers. Michigan has not included any additional sampling programs or studies. However, some local agencies have conducted voluntary programs. For example, the W.K. Kellogg Foundation funded a program implemented by the Calhoun County Health Department that sampled schools in Battle Creek. In Michigan's response to this EPA survey, we included a recommendation for EPA to allow schools to be considered as a primary LCR monitoring site so that more information about lead levels in schools would become available. However, no changes in sampling criteria have occurred to date.

In 2005, a Memorandum of Understanding was signed between the EPA, the Department of Education, the Centers for Disease Control and Prevention (CDC), the American Water Works Association, the Association of Metropolitan Water Agencies, the Association of State Drinking Water Administrators, the National Association of Water Companies and the National Rural Water Association to facilitate actions that reduce children's exposure to lead from drinking water at schools and child care facilities.

Across the country and in Michigan, most schools and child care facilities receive water from other community water systems. However, those schools that have their own source of drinking water are considered non-transient non-community water systems and are subject to the LCR. In Michigan, there are 755 such schools and child care centers that must monitor for lead to demonstrate compliance.

Busch, Stephen (DEQ)

OK

From: Busch, Stephen (DEQ)
Sent: Friday, February 27, 2015 1:48 PM
To: 'Crooks, Jennifer'; Deltoral, Miguel
Cc: Rosenthal, Adam (DEQ); Poy, Thomas; Porter, Andrea; Prysby, Mike (DEQ); Richard Benzie P.E. (BENZIER@michigan.gov); Shekter Smith, Liane (DEQ) (SHEKTERL@michigan.gov)
Subject: RE: HIGH LEAD: FLINT Water testing Results

Miguel and Jennifer,

Thank you for this information, we will take it under consideration.

The City of Flint:

- Has a 90th percentile lead level of 6.0 ppb based on 100 samples collected in its most recent monitoring period of 7/1/2014 – 12/31/2014, with 2 samples (23 & 37 ppb) over the AL.
- Has a 90th percentile copper level of 110 ppb based on 100 samples collected in its most recent monitoring period of 7/1/2014 – 12/31/2014, with no samples over the Cu AL.
- Has an Optimized Corrosion Control Program
- Conducts quarterly Water Quality Parameter monitoring at 25 sites and has not had any unusual results.
- Has never had a 90th percentile lead AL exceedance
- Continues to meet all applicable plant tap standards and treatment technique requirements at its WTP
- Has developed and implemented an Operational Evaluation of its treatment and distribution systems, and continues to adjust and update this OE based on updated quarterly results

My understanding from Ben Grumbles and the LCR Short Term Revisions is that "EPA regulations require water systems to develop a targeted sampling pool, focused on those sites with the greatest risk of lead leaching. All compliance samples used to determine the 90th percentile must come from that sampling pool." [40 CFR 141.80(c)(1)], 56 Fed Reg. 26518 (June, 7, 1991), [40CFR 141.90(a)(1)(v), and 40 CFR 141.90(h)(2)]. Our office continues to work with our community water systems to follow these and all other requirements of the current lead and copper regulations.

212 Browning, the site in question, is not part of the City's established sample site pool. The residence consists of PVC plumbing materials, and has an iron pre-filter at the service connection.

Regarding TTHM, the most recent quarter monitoring from February 2015 was issued today by the lab.
While 2 of the 8 DBP compliance sites continue to have an LRAA that exceeds the standard, quarterly results at all 8 DBP compliance sites were below less than half the standard level of 80 ppb, the highest being 28.5 ppb. Only one site now has an OEL over 80 ppb, at 85 ppb.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

From: Crooks, Jennifer [mailto:crooks.jennifer@epa.gov]
Sent: Friday, February 27, 2015 11:05 AM
To: Deltoral, Miguel; Prysby, Mike (DEQ)
Cc: Busch, Stephen (DEQ); Rosenthal, Adam (DEQ); Poy, Thomas; Porter, Andrea
Subject: Re: HIGH LEAD: FLINT Water testing Results

Hi, Steve and Mike. I talked with Miguel, and he said if you all would be interested in getting input from our expert, Mike Schock at EPA Cincinnatti Research, on the Flint distribution system issues and dealing with lead and DBP's together, you should contact Mike directly--here is his information.

schock.michael@epa.gov
(513) 569-7412

Jennifer

From: Deltoral, Miguel
Sent: Friday, February 27, 2015 4:58 AM
To: Crooks, Jennifer; Prysby, Mike (DEQ)
Cc: Busch, Stephen (DEQ); Rosenthal, Adam (DEQ); Poy, Thomas; Schock, Michael; Porter, Andrea
Subject: Re: HIGH LEAD: FLINT Water testing Results

Jen/all - I think things got garbled in translation...

What I was saying is that where you find Pb values that high, it is usually due to particulate lead. Not always, but generally. Particulate lead is released sporadically from lead service lines, leaded solder and leaded brass in a number of ways and folks tend to discount these values as anomalies, but particulate lead release is a normal part of the corrosion process and it is universal (common) in all systems. It's just that it is not captured as often by the infrequent LCR sampling. If systems are pre-flushing the tap the night before collec on thisting LCR compliance samples (MDEQ still provides these instructions to public water systems) this clears particulate lead out of the plumbing and biases the results low by eliminating the highest lead values. If systems are pre-flushing and still finding particulate lead, the amount of particulate lead in the system can be higher than what is being detected using these 'pre-flushed' first-draw samples. My point on that was that people are exposed to the particulate lead on a daily basis, but the particulate lead is being flushed away before collecting compliance samples which provides false assurance to residents about the true lead levels in the water.

Some quick notes on particulate lead release:

- Fe/Mn can transport lead from the lead service lines into the home. The lead sorbs onto the Fe/Mn particles. In GW systems, Fe/Mn can come from the source water and more Fe from the water mains. In SW systems, the Fe typically is released from the water mains.
- Lead released from lead service lines can also 'seed' galvanized iron pipes inside the homes. Again, the lead sorbs onto the iron on the pipes and be released sporadically. Generally, the higher the flow, the more Fe and Fe+Pb particulate you will likely get.
- If there is a partial lead service line (lead connected to copper) you can get additional lead release due to galvanic corrosion.
- Leaded brasses and solder can also release particulate lead under certain circumstances.
- The particulate can contain very high concentrations of lead (hundreds to thousands of ppb Pb) which is a much higher concentration than lead paint, so even small particles can result in high lead values.
- If the lead service line was disturbed (water main repair/replacement, meter installation repair/replacement, service line leak repairs, etc.) you can have VERY high lead levels in the scale and sediment that is dislodged from the inside of lead service lines. Here in Chicago, during a partial lead service line replacement, we collected the scale and sediment that came into the home and we found 300,000+ ug/L lead in the scale; 125,000 ug/L Pb in the sediment. Very dangerous.
- Higher levels of PO4 (3-4 mg/L Ortho) seem to reduce the amount of particulate Pb that is released in the absence of physical disturbances to the lead lines. Doesn't stop it entirely, but should generally

reduce the occurrence. Caveat – Other water quality issues can change the chemical complexes that form on the pipe, so cleaner sources with more consistent WQ form more predictable scale complexes.

If I remember correctly, Detroit is feeding PO4 for the LCR, but since Flint is no longer part of that interconnection, I was wondering what their OCCT was. They are required to have OCCT in place which is why I was asking what they were using.

Mike Schock is our resident expert and may be able to help out with the simultaneous compliance (Pb & DBPs) so I would suggest that folks give him a call.

Miguel A. Del Toral
Regulations Manager
U.S. EPA R5 GWDWB
77 West Jackson Blvd, (WG-15J)
Chicago, IL 60604
Phone: (312) 886-5253

From: Crooks, Jennifer
Sent: Thursday, February 26, 2015 04:15 PM
To: Prysby, Mike (DEQ)
Cc: Busch, Stephen (DEQ); Rosenthal, Adam (DEQ); Deltoral, Miguel; Poy, Thomas
Subject: HIGH LEAD: FLINT Water testing Results

Thank you, Mike. These results are dated 2/18/15, so they're probably different results than the results Adam had, but they still have to be included in with compliance calculation of the 90th percentile. What dates are the earlier compliance samples?

Yes, the stagnation of the water would increase the lead levels, and I'm glad you're following up with the City to get the lead levels reduced for Mrs. Walters' home—which will hopefully be effective for her neighbors because they are also most likely being exposed to these high lead levels. Miguel reminded me this morning, there are no safe levels of lead in drinking water.

I talked with Miguel Del Toral about his knowledge on research on lead. He said that high levels of iron, usually bring high levels of lead. The large amount of black sediment at Mrs. Walters' home, is most likely particulate lead, Miguel said, where the lead actually bonds to the iron sediment. While the particulates of lead/iron are small, they're very highly concentrated with lead—up to 95% lead.

Miguel was wondering if Flint is feeding Phosphates. Flint must have Optimal Corrosion Control Treatment—is it Phosphates? Or is it pH/Alkalinity Adjustment? The reason he asks, is because systems using the pH/Alkalinity adjustment have problems with lead levels in the 100's or higher—and they have problems with random lead particulate matter in the distribution system. Miguel said that we all know that flushing regularly helps reduce the lead concentrations, but not immediately. The City can't just flush in advance of taking the compliance samples, they have to flush the lines on a regular schedule.
The problem with high lead issues, is that the water has so many different variables, that it's hard to pinpoint what is causing what problem where. From a public health perspective, can we assume that the high lead levels in Mrs. Walters' neighborhood are isolated to just her area? Or are they more widespread?

Please feel free to contact Miguel directly—312-886-5253; Deltoral.miguel@epa.gov.

Jennifer

From: Prysby, Mike (DEQ) [mailto:PRYSBYM@michigan.gov]
Sent: Thursday, February 26, 2015 10:25 AM
To: Crooks, Jennifer
Cc: Busch, Stephen (DEQ); Rosenthal, Adam (DEQ)
Subject: RE: HIGH LEAD: FLINT Water testing Results

Jennifer,

I recall Adam showing me a high lead/copper sample result (perhaps it was this one)....as part of the city's routine lead-copper monitoring. If so, it was a stagnated sample as part of the sampling protocol. Adam mentioned that all other samples were below the AL...and the city will not exceed the lead AL. I will confirm this. The city; however, needs to take further action to help address Ms. Walter's concern. The type of plumbing needs to be identified and sample tap location within the premise plumbing. They should offer to re-sample for PB after flushing the tap to demonstrate that flushing the tap will reduce the lead concentration. The city also needs to provide other lead-reduction strategies to Mrs. Walters.

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 290-8817

From: Crooks, Jennifer [mailto:crooks.jennifer@epa.gov]
Sent: Thursday, February 26, 2015 10:53 AM
To: Busch, Stephen (DEQ); Prysby, Mike (DEQ)
Cc: Poy, Thomas; Deltoral, Miguel
Subject: HIGH LEAD: FLINT Water testing Results

Hi, Steve and Mike. Thanks for talking with me yesterday, Steve, about the most recent TTHM results. We'll look forward to receiving them whenever you get them back from the lab.

However, the main purpose of my email is to alert you to the high lead levels reported to a citizen yesterday by Flint Water Dept. I have been discussing the water situation with LeeAnn Walters since January, and she has been talking with Mike Glasgow at the plant about the black sediment in her water. (HUGE KUDOs to MIKE!!) He did test it to find that the iron levels were greater than his test would go; GT 3.3. But, because the iron levels were so high, he suggested testing for lead and copper. WOW!!!! Did he find the LEAD! **104 ppb.** She has 2 children under the age of 3... Big worries here.

So, Steve, this goes back to what you and I were talking about yesterday. That the different chemistry water is leaching out contaminants from the insides of the biofilms inside the pipes. I think Lead is a good indication that other contaminants are also present in the tap water, that obviously were not present in the compliance samples taken at the plant. VOC/SOC and inorganics/metals would be good samples to start with to take at the tap. And since Ms. Walters' drinking water is showing the high lead levels, her tap water would be a good place to start, I think.

We also talked about Dr. Joan Rose from Michigan State being on the Flint Tech Advisory Committee—you also mentioned that someone from the Dept of Community Health was on the Committee. I'm thinking that Dr. Rose would want to dive further into this, since there's actual evidence that the water is leaching contaminants from the biofilms; or

Dept of Community Health would want to get involved and look at this from an epidemiological perspective. (She and her family are also exhibiting the rashes when exposed to the water, and her daughter's hair is falling out in clumps.)

Maybe MSU could authorize the payment of the analyses for these samples? Or Dept of Community Health?

The citizen's name is:
LeeAnn Walters
212 Browning Ave
Flint, MI 48507
616-212-6233
Lwalters313@gmail.com

Jennifer

From: Lea Moste [mailto:lwalters313@gmail.com]
Sent: Thursday, February 26, 2015 9:08 AM
To: Crooks, Jennifer
Subject: Fwd: Re: Water testing Results

---------- Forwarded message ----------
From: "Michael Glasgow" <mglasgow@cityofflint.com>
Date: Feb 26, 2015 7:55 AM
Subject: Re: Water testing Results
To: "Lea Moste" <lwalters313@gmail.com>
Cc:
Lee,

Here are your Lead & Copper Results. This number is very high, 104 ppb of lead. In the last few months over 100 samples have been tested and only 2 were over the 15 ppb regulatory limit, and the highest level I have seen is 37 ppb. I will pass this info to Mr. Croft so he is aware. I will send the sample I collected from your kitchen faucet today for a complete metals test (12 different metals), to see what the level is without letting the water stagnate over night. I'm hoping that value will be much, but we will have to see. Sorry for this news, but I wanted to let you know right away.

Mike

On Tue, Feb 24, 2015 at 1:50 PM, Michael Glasgow <mglasgow@cityofflint.com> wrote:

> Lee,
>
> I will bring a copy of last years annual report when I stop by tomorrow. The annual report from 2014 must be delivered to residents by July 1st of this year. I imagine we may have it complete by June.
>
> Mike
>
> On Fri, Feb 20, 2015 at 1:00 AM, Lea Moste <lwalters313@gmail.com> wrote:
>
> > Mike,
> > Thank you for the water reports and we already planned to see you on the 25th at 10:00am. I was wondering if you know who I need to talk to in the water plant to obtain the Annual Drinking Water Report from last year. According to the EPA website there is link to access but when you click on it, it cannot be accessed.

Was also curious if there is an expected time frame for this years report due to the switch. If you can be of any assistance I would appreciate it.

Thank You
LeeAnne Walters

On Thu, Feb 19, 2015 at 12:47 PM, Michael Glasgow <mglasgow@cityofflint.com> wrote:

> Lee & Dennis,
>
> Here is a list of test results from water sampled at your home over the last 2 weeks. I have sent in your lead and copper sample, and also a sample from the toilet tank for manganese. I should hopefully have results from this testing early next week. I'll plan on stopping over on Wednesday (the 25th) around 10 am again to give you these results & sample again.
>
> Mike

SEND ICP/MS SOP TO LIANE

DRAFT – WORK IN PROGRESS

Protocol for Collecting Water Samples at Schools for Lead Analysis

The following is a detailed, step-by-step procedure to ensure samples are collected in a systematic, consistent manner to provide meaningful results. By following the below procedures school and health officials will have information to be able to identify and correct any sources that contribute lead into drinking water. The recommended procedures are:

- With the assistance from Department of Licensing and Regulatory Affairs (LARA) staff, conduct an on-site assessment of the building plumbing to prioritize sample sites.
- School staff collects the samples from prioritized sites and in the sequence recommended by LARA.
- School staff submits the samples and appropriate paperwork to the DEQ certified drinking water laboratory
- Laboratory performs analysis and informs DEQ-ODWMA staff of the results.
- DEQ informs DHHS of test results, and they jointly interpret the results.
- DHHS staff relays the results to school officials and confers on any follow-up or corrective remedies that may be needed.

Step 1 – Prepare for On-Site Assessment

In order to assist LARA staff to identify and prioritize sample sites, school staff should compile, collect, and review any records pertaining to the building plumbing. This includes building permits, plumbing permits, as built plans, and information about the service line and all potable water pipes, fixtures and appurtenances within the building. At a minimum, a diagram of each floor layout should be provided. In addition, answers to the following questions will help streamline the on-site assessment process.

- When was the facility built?
- Have new buildings or additions been added? If so, when were they added? If built since 1986, were lead-free plumbing and solder used?
- When were the most recent plumbing repairs made and where were they located?
- What are the potable water pipes in your facility made of and what is their location? Options include: lead, brass, copper, plastic, galvanized metal and other materials. What materials were used to solder the potable water pipes in your system? Are brass taps, fittings or valves used? Note the locations.
- How many of the following outlets provide water for consumption: Bubblers, ice makers, water coolers and kitchen taps. Note their location. Include taps that might be used for making coffee or preparing formula.
- What brands and models of water coolers (cooled drinking fountains) provide water in your facility and what is their location?
- Do faucets have accessible screens and have they been cleaned?
- Can you detect any signs of corrosion, such as leaks, rust-colored water or stains?
- Is any electrical equipment grounded to water pipes?

- Are there any records of previous water testing?

Step 1 – Arrange for On-site Assessment with LARA Staff

LARA staff will contact school officials/staff and set a date and time for the assessment. A school representative familiar with the building layout and plumbing system needs to accompany LARA staff as they conduct the assessment. A room reserved for records review should also available.

Step 3 – Prioritize Sample Sites and Sampling Sequence

It is recommended that all faucets, taps and outlets that are used regularly by students and staff for drinking, cooking, making coffee or food preparation will be sampled. High priority sites would include:

- Drinking Fountains (both bubblers and water cooler style).
- Kitchen Sinks, faucets or taps.
- Breakroom, classroom, teachers' lounge or other sinks known to be or visibly used for consumption (water glasses or coffeemaker and/or cups are nearby).
- Bottled Water Dispensers
- Ice Makers

LARA staff will assign a sample site Identification (ID) number for each sample site and the order in which each site is to be sampled. This number will reflect the type of tap/outlet and location. Sites closest to the service line are to be collected first, then in a sequence as they get farther from the service line until the site the farthest away is sampled last. This will minimize the chance that the piping is not flushed by a downstream or other sample location prior to collecting the samples at that site.

Step 4 - Labelling the Sample Sites and Preparing Labels for the Bottles

Coding Scheme for Water Outlets

A drinking water bubbler (DW) on the 2nd floor (02) of the middle school (MID), the 15th outlet counted, might be coded as follows.

- MID- 02- DW-015
- DW= drinking water bubbler
- WC = water cooler (chiller unit)
- CF = classroom faucet
- KC = kitchen faucet, cold
- KH = kitchen faucet, hot
- EC = home economics room, cold
- EH = home economics room sink, hot
- BF = bathroom faucet
- NS = nurse's office sink
- SC = service connector

In addition to the unique outlet code, a unique sample identifier is necessary if more than one sample will be taken from an outlet. A flush sample would also require a unique identifier. The first draw (P) and flush (F) samples taken for the above outlet would be MID- 02- DW-015-P-01 and MID- 02- DW-015-F-01

- P = primary (first draw) sample
- F = flush
- 01 = first flush sample at 30 seconds
- 02 = second flush sample at 2 minutes

Step 5 – Collect the Samples

After the sites and order of collection have been determined by LARA staff, the samples can be collected by school staff. While not a requirement, it is highly recommended that the samples be collected by someone with experience in water sample collection. In addition, make sure to inform all other staff including teachers, maintenance staff, parents and students of the sampling plans.

Sampling containers will be provided to you from the Michigan Department of Environmental Quality Drinking Water Laboratory. Each outlet should be labelled and posted **"DO NOT USE"** so that no water is used before sampling occurs. The sample sequence will be determined by DLARA so that sampling will occur closest to the water main/service line provided by the city.

1. Three samples will be collected from each designated sample site. Therefore, obtain three, 125 milliliter (ml) sample containers for each sample site from the DEQ laboratory.

2. Collect all water samples before any water is used. Ideally, the water should sit in the pipes unused for at least 8 hours but not more than 18 hours before a sample is collected.

3. Do not collect samples in the morning after a vacation, weekend or holiday. These results will not be representative because of the extended contact time with the water

4. The three samples from each site are to be collected at first draw, after a 30 second flush, and a 2 minute flush as follows:

    a. After the appropriate 8 – 18 hour stagnation time, place the first bottle under the tap, open the tap to produce a slow, steady "pencil thin" flow and fill the bottle to the appropriate level.
    b. 30 seconds after filling the first bottle, fill the second bottle.
    c. 2 minutes after filling the second bottle, fill the third bottle.

5. Make sure to not turn the faucet off and on in between samples or adjust the flow between samples.

6. Make sure to mark the bottles as "first draw", "30 sec flush" or "2 min flush" and also indicate this information on the sample submission form.

7. Assign an appropriate sample Identification (ID) number to each sample collected. Record this number (including the flush time) on the sample container and submission form.

8. Collect the remainder of the samples from all designated sites in the pre-determined order as recommended by LARA.

9. Deliver or ship the samples to the lab as instructed.

How to Collect an Initial (First Draw) Sample

- Make sure you have clean hands.
- Complete the sample recording form.

- Only use containers (125 ml) supplied by the DEQ laboratory.
- Containers should not be opened unitl you are ready to collect the sample.
- Sampling containers that have been compromised in any way, e.g., by being touched on the threads or the interior surfaces, must not be used.
- Keep food and drink away from the sample and its container.
- Make sure no water has been withdrawn from the tap or water fountain before you collect the sample.
- Place the container under the faucet or drinking water fountain that is being tested and collect 125 ml of water.
- If a faucet is being tested make sure you turn on the cold water tap.
- Turn on the water and fill the container without allowing any water to rund own the drain.
- Close the container according to the instructions from your certified lab.
- Make sure the container is labeled with the same information from your sample recording form.
- Prepare the container for shipping according to the DEQ lab's instructions.
- Samples must be delivered to the lab within 14 days of collection for proper testing.

How to Collect Flush Samples

After the first draw sample has been collection allow the water to run down the drain for 30 seconds. Then collect a sample using the same protocol as above.

After the 30 second flush sample has been collected allow the water to run down the drain for 2 minutes. Then collect a sample using the same protocol as above.

DRAFT

Step 6 - Laboratory performs analysis and informs DEQ – ODWMA staff of the results

D. George - Fyi

DRAFT

Michigan Department of Community Health (MDHHS) Flint Water Action Plan
Week of October 18, 2015

Action	Local Lead	MDHHS Lead	Tasks
Filter/Water Distribution	Tamara Brickley (Genesee County Health Department-GCHD)	Sheryl Thompson, MDHHS	- Coordination of distribution (GCHD) - Identify at-risk sub-groups (GCHD) - Ordering filter replacements (MDHHS) - Amend cloud-based filter database to compile all records of filters distributed (including filter type) in preparation for replacement filter distribution (MDHHS & GCHD) - MDHHS has distributed 9,000+ filters
Blood Testing	Tony LaRocco (GCHD) Possible partners: - Hurley - Greater Flint Health Coalition - MIHP - LHD - Schools	Dr. Eden Wells/ Nancy Peeler (CLPPP)	- Test all o Students 0-16 o Priorities: ▪ 3 schools ▪ 2 zip codes ▪ ages 0-15 - Convene meeting with GCHD and all potential partners (MDHHS) o Partner with schools-information about testing sites options distributed through school districts to parents o Partner with Great Flint Health Coalition-network to develop testing sites and information about testing to healthcare providers o Partner with health plans - Confirmed that the state lab has capacity to handle increase in tests - Blood testing and follow-up protocol is being finalized - Develop protocol for case management of confirmed children with EBL >5. Targeted completion of Oct 23. - Contract (project) via EGRAMS to GCHD for nurse case management. Targeted completion of Oct 23.

Case Management Follow Up	Tony LaRocco (GCHD)	Eden Wells/ Nancy Peeler (CLPPP)	- Identification of all current positives- confirmatory testing for > 5 mcg/dl (as of April 2014) - Maintain registry of all tests performed (-/+) - Follow-up all cases >5 mcg/dl with the CLPPP Case Management protocol - Establish contract for service. Targeted completion of Oct 23.
Elevated Blood Level Investigations(all > 5 mcg/dl)	Dawn Hallwood & Sherry Taylor (GCHD)	Linda Dykema & Nancy Peeler	- Secured financial resources necessary to support environmental health response - Followed-up with CLPPP to see if immediate funds available. CLPPP is arranging contract with GCHD this week. - Recommendation to contract with Lead Investigation company thru SEMHA- licensed investigators - Bids taken and contract development underway for contractor to conduct investigations in homes with elevated blood level (EBL). This is pending a discussion with MDHHS Budget - Developed form to collect address and parent information at clinics and/or labs to assist with EBL investigation process
Communications	Hilda McShane (GCHD)	Geralyn Lasher	- Continuing daily MDHHS and GCHD phone calls (3PM) - Provide provider education- links sent for Governor's site to GCHD 10/12 - Provide public education - Provide risk education - Provide links with lead prevention information to Flint - Completed of FAQ and infographic for dissemination on Governor's website - Assisted MDARD on development of communication to food service establishments - Development of a letter and resources for schools to send to parents (educational materials to encourage testing) and a letter to providers, daycares, and Head Start programs

			- Outreach to area laboratories regarding reminder of lead reporting requirements (pending) - Provide a continued response to public phone calls about the Flint water situation
After Action Review	TBD	Tim Becker	- Review internal processes from Department and the Genesee County Health Department on promptness of review at local and state level.
Miscellaneous	TBD	Linda Dykema, Nancy Peeler, and Wes Priem	- Provide support to DEQ for water testing in the schools, development of water testing protocol, and screening levels for evaluation of water data of schools (Dykema on technical committees). - Participate in the Flint Mayor's Technical Advisory Committee and in weekly subcommittee meetings to address water sampling efforts in Flint schools - Began discussions on evaluation metrics and reporting for investigations and case management

City of Flint
Technical Advisory Committee - Weekly Report

October 28th, 2015

Last meeting: 10-7-2015
Next meeting: 11-9-2015, 2:00 pm

I. **Overview –**

Please note that we have set the date for the next meeting at **Monday November 9th** 2:00 pm at Flint City Hall (there will be a call in number). The previous date proposed is Veterans Day and there were several conflicts.

II. **New Items this week**

Technical Advisory Committee Addition

I have added Professor Shawn McElmurry, An Associate Professor at Wayne State University in the Dept. of Civil and Environmental Engineering to the TAC team. Professor McElmurry contacted me a few weeks ago and visited the Water Plant and took several samples from the Flint River and the distribution system.

Professor McElmurry's team has submitted a proposal to the National Institute of Environmental Health Sciences (NIEHS) for funding to evaluate how changes in the drinking water system are impacting water quality. Their project has the following goals:

- Define exposure within Flint's drinking water system using a combined sampling and modeling approach.
- Quantify how the concentrations of DBPs and Pb change over time within the water distribution system.
- Apply a high-throughput bioassay to evaluate toxicity of complex chemical mixtures (focused on DBPs).
- Communicate results to water utility operators, government officials (city, state, and federal), public health agencies and residents using principles of risk communication through a variety of channels including social media.

Given their goals and their proximity to Flint, I believe that adding Professor McElmurry to the Technical Advisory Team will bring added evaluation and data to our cause.

III. **Ongoing Items of concern or in process**

A. Detroit Water

Water from Detroit is now flowing through all of the transition mains and should be present at most taps throughout the City. We are flushing hydrants in a manner to help circulate water within the system. Individual usage patterns will dictate water being at every household and business. We will be testing hardness and phosphate levels over the next several days across the city to verify the presence of Detroit water.

B. Service Lines

I want to clarify where we are regarding the service line data. The 45,000+ cards are only one aspect of the information and represent the original data. As work has occurred over the last several decades, the Service Center has built a second, partial set of cards with updated information. Both sets of cards are kept as permanent records with accurate data. We also have maps which were last updated in 1984 with additional information. Finishing what the City started has involved stitching together three sets of data and then putting that into a database.

U of M Flint has taken ownership of the project and they have measured how much labor it will take to complete the task. Professor Kaufman is working pro bono but has just submitted a proposal to the City for the labor required in order to complete the task. The proposal will be turned around ASAP for them to complete the work.

C. Corrosion Control

On October 19th 2015 our engineering consultant submitted a design package to the DEQ with recommended phosphate dosing. After EPA review, the comments were just returned and today LAN is discussing with DEQ when to expect final approval and permitting. There are questions regarding the elevated dose of phosphate that we will bring to the next Technical Advisory meeting for discussion. The questions will are largely around the pros and cons of the specified dose level and the public communication and expectations that should accompany the implementation.

Issue	Description	Action Item	Owner
Corrosion Control	To help recoat the piping	The final design has been sent to MDEQ for perfting.	LAN
Surge Protection	Main breaks are down.	Leak detection will continue for the next few months.	City Staff
KWA - Prep	Design and installation of final improvements needed	Internal November 5th meeting scheduled to discuss specifics. See item IV.	LAN/City
KWA - Transfer Station	Buffer for water supply from KWA	Internal November 5th meeting scheduled to discuss specifics. See item IV.	LAN
Hydraulic Model	Filling with data	Need to verify broken valve locations for model to be accurate.	LAN/City
SCADA Upgrades	Used to develop automation within the system.	First phase went in in FY15 second and final phase due to be installed prior to KWA's arrival.	City Staff

IV. Needs for treating and using water from KWA

The City is meeting with the engineering consultants on Thursday November 5th in order to build a project timeline of all items needed to be prepared for water delivery from KWA. The following items will be discussed:

A. Design and construction of transfer station to Dort Reservoir (while in use).
   - Needed to buffer the volume of water that KWA is capable of delivering prior to their reservoir tank being activated.

B. KWA access to the plant.
   - The current design calls for use of the pipe that was empty and is now in use. An alternate plan needs to be discussed and vetted.

C. Alum feed system
   - Needed for coagulant change to raw water and to reduce chloride.

V. Testing Data

We will continue to update this data table weekly, if there is something that is missing or additional data that is requested please let me know and we will attempt to add it to the table.

Date	Flow (MGD)	pH (S.U.)	Total Hardness (mg/L)	Total Alkalinity (mg/L)	Non-carbonate Hardness (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Total Phosphate (mg/L)
Range GLWA	12 - 19	7.3 - 7.6	98 - 102	70 - 76	26 - 32	11 - 13	26 - 32	3.9 - 6.3	1.0 - 1.2
10/26/2015	12	7.36	102	74	28	11	30.5	6.3	1.14

City of Flint Water
Action Steps for Week of October 19-23

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Update 2004 letter to EPA	DEQ	Dana DeBruyn	This Action Step has been incorporated as part of the After Action Plan (Action Step #4)
2.	Schedule Flint Water Treatment Plant tour	DEQ and Flint	George Krisztian	Scheduled for 10/23/15 at 11:30 a.m.
3.	Figure out number of samples from schools and child care facilities	DEQ	Jim Sygo Pat Cook Steve Busch	1,300 samples (13 schools and 100 samples per school)
4.	Conduct After Action Plan	DEQ	George Krisztian	Initial meeting ~~to be scheduled for week of 10/19/15~~ for 10/22/15
5.	Introduce legislative changes to Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone George Krisztian Sonya Butler	Draft language submitted to Maggie Pallone for review
6.	After Action Review Panel	DEQ	Madhu Anderson George Krisztian Karen Tommasulo	Panel Created & Press Release Issued 10/21/15
7.	Staff hiring plan	DEQ	Jim Sygo Maggie Pallone George Krisztian	
8.	$1 million for DEQ Laboratory billing code	DEQ	Maggie Pallone George Krisztian	Billing Codes Created on 10/21/15
9.	Finalize fiscal year 2017 budget request	DEQ	Maggie Pallone George Krisztian	

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
10.	Develop letter to schools	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	This Action Step has been incorporated into Action Step #13
11.	Finalize sampling protocol Protocol Revised To Include Comments By EJ	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	Revised draft sampling protocol shared with DLARA, DHHS, EPA, and Genesee County Health Department on 10/19/15 for comment
12.	Confirm school sampling logistics	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	Logistics Have Been Finalized For The Initial Sampling Scheduled For 10/24/2015
13.	Meeting(s) with school staff/management	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	A meeting with the 10 remaining schools is tentatively scheduled for the week of 10/26/15
14.	Meet with DHHS and discuss all lead education material for schools	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	DEQ has contacted DHHS to schedule a meeting
15.	ODWMA staff observe a DLARA plumbing assessment	DEQ and DLARA	Steve Busch Pat Cook Mike Prysby	Initial plumbing assessment is scheduled for 10/23/15; sampling to occur on 10/24/15
16.	Develop sample form and chain of custody document	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	DEQ Laboratory has created a fillable PDF form for use in the school sampling protocol

Comments Received By EPA Task Force Continuing To Finalize Protocol

DEQ Staff Observed Plumbing Assessment at Flint Elementary School on 10/23/15

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
17.	Review corrosion control treatment plan and get any EPA comments	DEQ and EPA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Conference call with EPA held on 10/20/15 to discuss comments
18.	Review construction permit application and issue construction permit for phosphate equipment	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	Construction permit is in process ADDITIONAL DISCUSSIONS IN PROCESS WITH CITY OF FLINT
19.	Review Standby Operation of Flint Water Treatment Plant with city of Flint Comments by DEQ to City of Flint have been provided	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	~~Received~~ DEQ STAFF ARE REVIEWING & SEEKING CLARIFICATION ON COMMENTS ~~BE~~ RECEIVED FROM EPA TASK FORCE.
20.	Provide city of Flint updated monitoring schedule based on Detroit Water and Sewerage Department (DWSD)/Great Lakes Water Authority (GLWA) service	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	FLINT LETTER DRAFT CONTINUED BASED ON ONGOING REVIEW TO FLINT.
21.	Contact city of Flint and Genesee County Health Department daily for DWSD connection status updates	DEQ, Flint, and Genesee County Health Department	Jim Sygo Steve Busch Pat Cook Mike Prysby	Switch to DWSD completed on 10/16/15; city of Flint will let DEQ know if they run into any unforeseen issues
22.	Work with Karegnondi Water Authority (KWA) and other agencies to address bottleneck issues	DEQ and KWA	Jim Sygo Steve Busch Pat Cook Mike Prysby	MONITORING LETTER EXPECTED TO BE MAILED ON 10/22/15
23.	Verify city of Flint distribution operations under DWSD/GLWA service	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	FOR SWITCH BACK TO DETROIT WATER HAS BEEN SHOWN TO FAIL.

ISSUES ENCOUNTERED DURING SWITCH BACK TO DETROIT WATER HAVE BEEN RESOLVED

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
24.	Contact city of Flint for Service Line Record status update and obtain a copy of the records to date	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	
25.	Provide DHHS with any available cross-reference information	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
26.	Develop childcare facility guidance or review DHHS related materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	DEQ has contacted DHHS to schedule a meeting

Busch, Stephen (DEQ)

From: Busch, Stephen (DEQ)
Sent: Thursday, March 19, 2015 3:05 PM
To: Richard Benzie P.E. (BENZIER@michigan.gov); prysbym@michigan.gov; Shekter Smith, Liane (DEQ) (SHEKTERL@michigan.gov)
Subject: FW: Information Request and Documentation

Response from Jim Henry below.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

From: Henry, James [mailto:jhenry@gchd.us]
Sent: Thursday, March 19, 2015 12:15 PM
To: Busch, Stephen (DEQ)
Cc: Valacak, Mark; Cupal, Suzanne
Subject: RE: Information Request and Documentation

Hello Mr. Busch,

Thanks for your response. I'm looking forward to working with your office moving forward. Based upon my experiences with this investigation, I think it is necessary for my communications to be candid and followed up in writing whenever possible. Our goal is to successfully conduct this investigation in efforts to better protect the public.

I agree there are ambiguities written in the FOIA request. GCHD does not have municipal water system expertise and we are continuously learning about the processes. The FOIA request is specific enough that we should have received a timely response from the City of Flint. Also, it is addressed to the City and I apologize if there were misunderstandings regarding the intended recipient.

There have not been any conclusions regarding the source of illnesses. Our team is gathering information and we suspect there may be several sources. It has been made clear that the Flint municipal water system is in compliance with the Safe Drinking Water Act. It seems reasonable that your office would be involved regardless if a potential health risk from municipal water is related to consumption, inhalation or dermal exposure. Perhaps the legislation should be revisited to better address risks.

As you mentioned, we had communications with your office in October 2014, regarding Legionella, but I also had three telephone conversations with Mr. Michael Prysby, from your office between January 21, 2015 and January 23, 2015. These conversations occurred around the same time that your office participated with the TTHM presentation in Flint. I "explicitly explained" the details of the Legionella concerns and the possible associations with the Flint municipal water system and I specifically requested to meet with your office for further discussions.

Mr. Prysby informed me that the concerns were discussed with you. I was informed there was no reason to meet because the municipal water system is in compliance with the Safe Drinking Water Act. Other than the timeframes written in your email, you are correct, I did not contact your office again until the email, dated March, 10, 2015.

GCHD has been working closely with MDCH and has consulted with CDC on several occasions regarding the epidemiological investigation. Also, we have been working with Legionella and municipal water experts, and recently

with the USEPA. Based upon these discussions we have been informed that it is likely that a small amount of Legionella will survive the water treatment process at the plant and enter into the distribution system.

Our team is in the process of developing plans, which may include sampling locations within the distribution system and comparing environmental and clinical isolates. We recognize potential social, political and economic impacts regarding this investigation and need to be prepared for all outcomes. Hopefully, your office, the regulatory agency, will be available for assistance.

If a representative from your office is available to meet next week, please respond with some dates and times. I think it would be appropriate for the City to attend meetings and I will contact Mr. Croft, Flint DPW Director, after I receive a response from your office.

Thank you

Jim

Jim Henry
Jim Henry RS, MBA
Environmental Health Supervisor
Genesee County Health Department www.gchd.us
630 S. Saginaw St., Suite 4
Flint, MI 48502-1540
Phone (810) 257-3618 Fax (810) 257-3125
E-mail jhenry@gchd.us

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For a copy of the Health Department's Notice of Information Practices, contact the Health Department or visit the Health Department's website at http://www.gchd.us/

From: Busch, Stephen (DEQ) [mailto:BUSCHS@michigan.gov]
Sent: Friday, March 13, 2015 3:47 PM
To: Henry, James
Cc: Prysby, Mike (DEQ); Shekter Smith, Liane (DEQ)
Subject: RE: Information Request and Documentation

Mr. Henry,

The January 27, 2015, FOIA request you provided was directed to the City of Flint, not the DEQ. The DEQ has no record of a FOIA request from your office for such information. It is our understanding that the City has responded to your FOIA request, has helped you adequately redefine your request within the City's scope of public record to address such ambiguities as "any additional areas of concern", and provided you with additional information beyond the scope of your request.

The DEQ fully recognizes the public health threat posed to individuals that contract Legionnaires' Disease with the understanding that the disease is not contracted by ingestion of potable water and therefore not regulated under the federal Safe Drinking Water Act. Your email below claims that you have explicitly explained the situation to our

Department. However, since contacting our office early last October to indicate a rise in cases, we have not received any further information regarding your epidemiological investigation into this matter.

Further, conclusions that legionella is coming from the public water system without the presentation of any substantiating evidence from your epidemiologic investigation appears premature and prejudice toward that end.

It is highly unlikely that legionella would be present in treated water coming from the City of Flint water treatment plant given the treatment plant's use of ozone along with complete treatment and chlorine disinfect contact time to comply with federal surface water treatment rules for potable water. Detections of total coliform or heterotrophic bacteria in the City's public water distribution system indicate an environment where bacterial growth may be supported. However, there is no direct correlation that can be made to the presence of legionella. While total organic carbon levels in potable water may serve as a food source for bacteria growth in private plumbing system, water temperatures in the City's distribution system are below legionella growth range, and chlorine residual levels would also limit such growth.

Our office agrees that water main breaks, water leaks, and system repairs are possible vectors for legionella to enter the public water system. These should be investigated as part of your epidemiology. DEQ staff can be made available to assist GCHD and the City regarding such matters, but to date no request by GCHD for any such meeting has been received, let alone declined as alleged in your email.

If GCHD is seeking assistance to complete its epidemiological investigation regarding this matter, such resource requests should be directed to the Michigan Department of Community Health. Our Office agrees that a multi-agency partnership would be beneficial to move forward and develop a unified response. In that respect, if our Office can be of any further assistance you may contact me directly.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

From: "Henry, James" <jhenry@gchd.us>
Date: March 10, 2015 at 6:40:17 PM EDT
To: Howard Croft <hcroft@cityofflint.com>, "Mike Prysby (DEQ)" <prysbym@michigan.gov>, Elizabeth Murphy <emurphy@cityofflint.com>, "Natasha Henderson" <nhenderson@cityofflint.com>, Jerry Ambrose <gambrose49@gmail.com>, Dayne Walling <dwalling@cityofflint.com>
Cc: "Valacak, Mark" <MVALACAK@gchd.us>, "Cupal, Suzanne" <scupal@gchd.us>, "Hasan, Shurooq" <shasan@gchd.us>, "Childs, Bonnie" <BCHILDS@gchd.us>, "Hallwood, Dawn" <dhallwood@gchd.us>, "Johnson, M.D., Gary" <GJOHNSON@gchd.us>
Subject: Information Request and Documentation

Hello everyone,

The Genesee County Health Department has made several written and verbal requests for specific information since October, 2014, including a Freedom of Information Act Request on January 27, 2015. The information still has not been received and the city's lack of cooperation continues to prevent my office from performing our responsibilities.

The Genesee County Health Department has the responsibility to conduct illness investigations and consider all potential sources, this is not optional. In 2014, Genesee County experienced a significant increase of confirmed Legionella illnesses relative to previous years. Legionella can be a deadly, waterborne disease that typically affects the respiratory system.

The increase of the illnesses closely corresponds with the timeframe of the switch to Flint River water. The majority of the cases reside or have an association with the city. Also, McLaren Hospital identified and mitigated Legionella in their water system. This is rather glaring information and it needs to be looked into now, prior to the warmer summer months when Legionella is at its peak and we are potentially faced with a crisis.

This situation has been explicitly explained to MDEQ and many of the city's officials. I want to make sure, in writing that there are no misunderstandings regarding this significant and urgent public health issue. The Trihalomethane issues "pale in comparison" to the potential public health risks of Legionella.

I am submitting the attached FOIA request again and requesting that the legal obligations of the request are met. If the information is not available, please let me know. In the past, I have requested to meet with the water plant staff and MDEQ regarding Legionella concerns. I did not receive a response from the water plant staff and MDEQ declined. I think it is in the best interest for all stakeholders that we meet and discuss the issues.

Respectfully,

Jim

Jim Henry
Jim Henry RS, MBA
Environmental Health Supervisor
Genesee County Health Department www.gchd.us
630 S. Saginaw St., Suite 4
Flint, MI 48502-1540
Phone (810) 257-3618 Fax (810) 257-3125
E-mail jhenry@gchd.us

Flint Drinking Water Action Plan Update

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

- Action Step #1 has been incorporated into the After Action Plan (Action Step #4).
- It was determined that the information in Action Step #10 would be communicated better in person and has, therefore, been incorporated into Action Step #13.
- DEQ staff has tentatively identify the week of October 26 to meet with representatives from the remaining 10 locations in the Flint Community Schools who were not present at the October 16 meeting at the Superintendent's office.
- DEQ staff has contacted DHHS to request a meeting regarding lead education materials for schools.
- The first plumbing assessment has been scheduled for Friday, October 23. The subsequent sampling of the first facility has been scheduled for Saturday, October 24. This decision was made jointly among DEQ, DLARA, and DHHS in an effort to ensure that sampling staff could properly evaluate the sampling protocol without the added pressure of completing the sampling process before students arrived on-site.
- The DEQ Laboratory has created a fillable PDF form for use in the school sampling protocol. This form was created to streamline the information gathering process. The form was submitted for review by staff in DEQ, DHHS, and DLARA, and comments were subsequently incorporated. The form is now complete and ready for use.
- The corrosion control treatment plan (CCTP) and permit application were received late last Friday, October 16, and were reviewed. Our review comments were provided to Flint's consultant [Lockwood, Andrews & Newnam, Inc. (LAN)]. The CCTP was forwarded to EPA on October 16, and their comments were received on October 19. A conference call was held on October 20 between our staff and Darren Lytle and Michael Schock of EPA to discuss the main comments (EPA's and DEQ's) to confirm that both agencies concur with the design and proposed corrosion control dosages. We are currently preparing a revised set of comments, based on our discussion with EPA. The revised comments will be sent to EPA to confirm concurrence before sending to LAN.
- An Act 399 permit will be issued to the city of Flint to install corrosion control treatment following receipt of revised plans, specs, and – as needed – a permit application that addresses the revised review comments.
- DEQ staff has contacted DHHS to schedule a meeting to discuss the development of childcare facility guidance. This guidance will be similar in nature to what is being done in schools but will be tailored to address the specific

concerns with younger children and the smaller plumbing infrastructure of typical childcare facilities.

Additional Actions:

- Standing meetings with the city of Flint have been scheduled for Fridays at 10:00 a.m. These meetings have been scheduled through December 18. In addition, a tour of the Flint Water Treatment Plant has been scheduled for October 23. The DEQ be taking video footage of the tour, showing the coordinated efforts being taken by the city of Flint, DEQ, DHHS, and DLARA. Genesee County Health Department (GCHD) has been invited to the Friday meetings as well as the tour, and GCHD is in the process of determining if they can participate.

- A meeting was held between staff from the DEQ, DLARA, and DHHS to discuss details regarding the flow and coordination of efforts for the school sampling protocol. It was mutually agreed that it was best to only do one school at first so that we can ensure that the process runs smoothly from partner to partner. The first plumbing evaluation will be done at Freeman Elementary School on Friday, October 23. Steve Busch of the DEQ will accompany staff from DLARA to answer questions they might have during their plumbing evaluations. The subsequent water sampling effort will take place the next day, on Saturday, October 24. It was agreed that taking the samples on Saturday would allow staff to be able to evaluate the sampling process without the added pressure of ensuring that the sampling was complete before students arrived at the building.

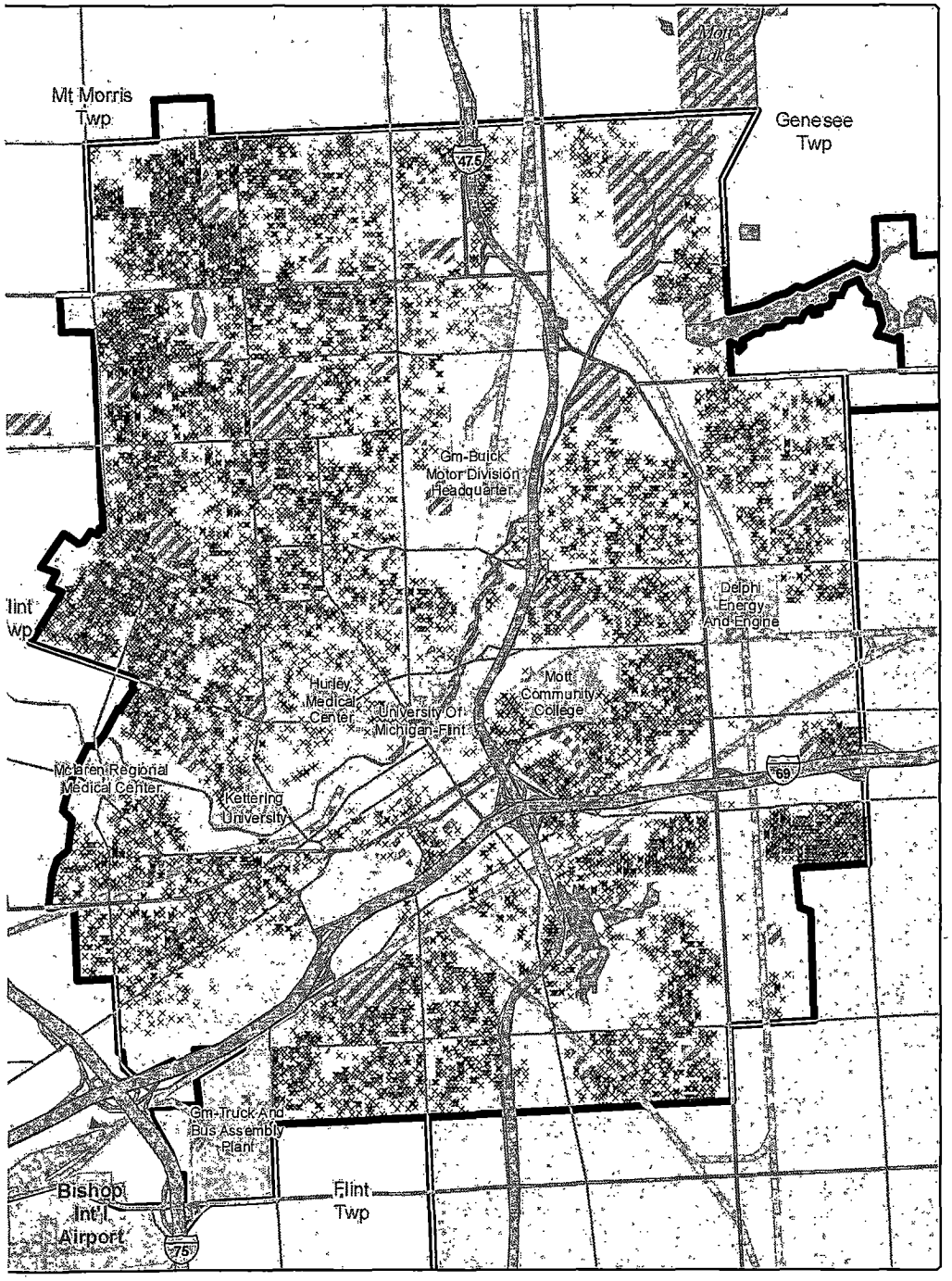
- DEQ Director Dan Wyant, Jim Sygo, George Krisztian, and Karen Tommasulo held a conference call with Dr. Susan Hedman, EPA's Regional Administrator, and other representatives from EPA to discuss the EPA's formation of the Flint Safe Drinking Water Task Force. The purpose of the Task Force is to provide one-stop shopping for technical assistance for the optimization of corrosion controls for the switch from Detroit Water and Sewerage Department to the Karegnondi Water Authority. EPA requested a point of contact for the DEQ, and Director Wyant suggested Chief Deputy Director Jim Sygo. EPA agreed that this was an appropriate choice and requested a formal letter indicating Chief Deputy Director Sygo as the point of contact.

- DHHS has indicated that the total water filter/pitcher distribution for the period of October 6 through October 20 was 9,373 units.

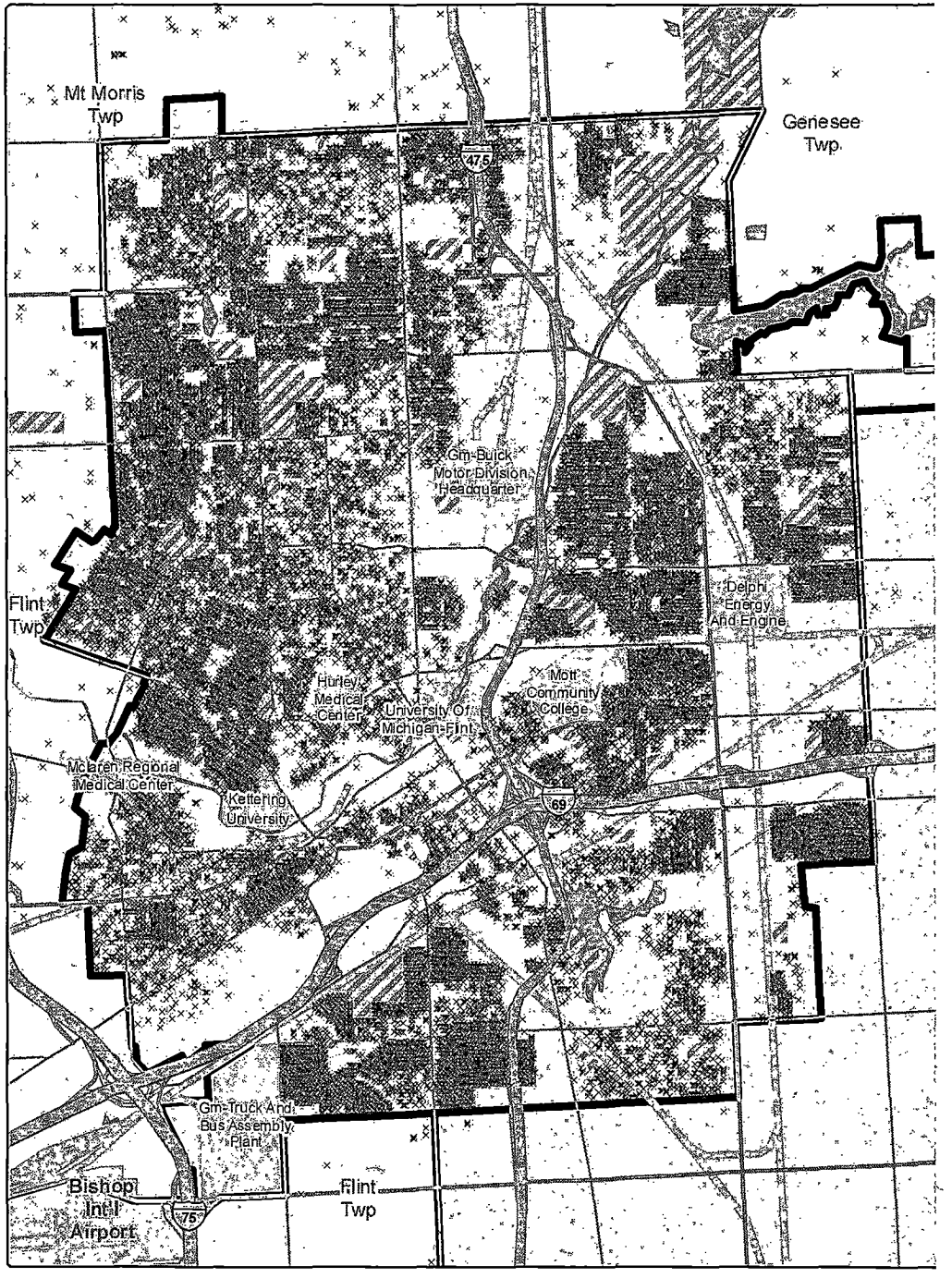
Prepared by: George Krisztian, Flint Action Plan Coordinator
Laboratory Director
Department of Environmental Quality
Telephone: 517-284-6719
Cell: PPI (new number)
October 21, 2015

Flint Water Response Team Activity

As of Wednesday, January 13, 2016



As of Monday, January 18, 2016



Michigan State Police
Emergency Management and Homeland Security Division

× Home of Citizen Reached Major Campuses Parks and Recreation Vacant Parcel

Miles 0 0.5 2 3 4

Thelen, Mary Beth (DEQ)

From: Joan Rose <rosejo@msu.edu>
Sent: Monday, November 30, 2015 4:37 PM
To: Thelen, Mary Beth (DEQ)
Subject: : Meeting with Director Dan Wyant
Attachments: Flint Water Quality Assessment Letter.doc

Hello Mary Beth.

Can you pass this on to Dan. He wanted a copy of this letter. I sent this before the decision to switch back to Detroit water.

Joan

Joan B. Rose
Homer Nowlin Chair in Water Research
Dept of Fisheries and Wildlife
480 Wilson Road
Natural Resources Building, Room 13
Michigan State University
East Lansing, MI 48824
rosejo@msu.edu
Phone: 517.432-4412

http://www.fw.msu.edu/~rosejo/
http://camra.msu.edu/
http://cws.msu.edu/

On 11/20/2015 10:54 AM, Thelen, Mary Beth (DEQ) wrote:

> This is an automated response to your email message.
>
> **November 20, 2015, 8:00-5:00**
> Thank you for your email. I am out of the office. I will respond back to you as soon as I can. If this is urgent, please contact Karen Shaler at 517-284-6700. She will also monitor my email.
>
> Thank you.
>
> Mary Beth
>
> Mary Beth Thelen
> DEQ
> 517-284-6700

MICHIGAN STATE
UNIVERSITY

Oct. 1, 2015

Honorable Congressman Dan Kildee
5th District of Michigan
Flint MI

Dear Congressman Kildee

I am a public health water microbiologist and hold the Homer Nowlin Chair in Water Research at Michigan State University and my expertise involves water quality and health. I am a member of the National Academy of Engineering and I have served as Chair of the Drinking Water Committee, (2004-2010) Science Advisory Board of the US Environmental Protection Agency,

I am preparing this short letter in regard to my assessment of the water quality and health issues in Flint. I have reviewed Dr. Marc Edwards' proposal, methods and results for lead. I have been in discussion with the County Health Department and reviewed the health issues. I have served on the Technical Advisory Committee for the City of Flint and have read the reports provided by Veolia and the City. I have been involved since January, 2015.

I will attempt to address five critical questions.

1. Is there a water quality problem in Flint?
2. How well is the problem understood?
3. What water quality testing should be done?
4. How can the state help the citizens of Flint?
5. How do we restore water quality and wholesomeness, protect public health and restore confidence?

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1. Is there a water quality problem in Flint?

In the US and in Michigan we pride ourselves not only on our safe drinking water meeting the national *Safe Drinking Water Act*, (*SDWA*) health based primary standards but on the wholesomeness of the water with high expectations associated with taste, odor and appearances. The *SDWA* however does not cover all of our water quality issues particularly in regard to the piping and plumbing system that makes up what is called the distribution system. **It has been well documented that when one changes the source water one can change the quality of the finished water at the tap due to the chemical, biological and physical conditions of the distribution system.** See "The Rise and Fall of the CAP: What went wrong with Tucson's Water Delivery of the CAP"
http://academic.engr.arizona.edu/HWR/Fall02/Stacy/CAP_Project/Documents/AZDS_Rise_Fall_of_CAP.pdf

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There is no doubt that Flint had and still has a drinking water quality problem and this is effecting the health and wellbeing of the residents. The violations of the *SDWA* are well documented.

- In the summer of 2014, the first health violation was the finding of *E.coli* which mandates a boil order due to the potential for acute infectious disease risks associated with fecal contamination. This bacteria mandates that immediate action is taken which is why boil orders are issued and after which the treatment including disinfection must be examined.
- Following this were the violations of the disinfection- by-products standards for Total Trihalomethane TTHMs as a result of misbalance of the disinfection process where chlorine reacts with organics and forms these by-products. This is known as a chronic health risk in which long term exposure to these TTHMs may be a source of cancer.
- In addition the wholesomeness of the water in key areas of the city was clearly effected, with red and cloudy water emerging from the taps was probably due to iron sloughing from the pipes. With iron other things also come off the pipes, including lead and microbes.
- The public complained of skin irritation and illnesses which were never diagnosed. However *Legionella* infections (a waterborne pathogen) increased.

It is not a coincidence that this was associated with the change in the source water (higher hardness, more chlorides, more fecal pollution in the Flint River compared to Lake Huron). By the time winter came around and the weather changed and the temperatures went down, some of the issues abated. The Water Utility took on extensive changes in design, treatment and operations to decrease the *SDWA* violations. There was a sense of urgency to address the water quality before the spring and summer as warmer temperatures exacerbate these problems. While dollars were provided for treatment changes and upgrades, less funds were allocated toward monitoring the distribution system. Dr. Marc Edwards from Virginia Tech University an internationally renowned scientist associated with plumbing and water quality issues received funds from the National Science Foundation and began monitoring and has found high levels of lead in the tap water. He set up a web site for his data [http://flintwaterstudy.org/]. The health department has seen cases of *Legionella* continue and now lead blood levels have been found in children. **Many of the public still have water which is not drinkable despite meeting standards, thus wholesome and safe water is not being provided to all the citizens of Flint. This is not the intention of the *SDWA*.**

2. How well is the problem understood?

The science and mechanisms of dissolution of materials like minerals, iron, biofilms which accumulate on a pipe are understood. The role of Chlorides associated with corrosion are known. *The Lead and Copper Rule* was designed to address the leaching of lead from the distribution system and mandated a very specific monitoring program.
http://water.epa.gov/drink/ndwac/upload/lcrwgmeetsumaxd32514.pdf

Yet when it comes to the real-world distributions systems, the older infrastructure, the complex nature of the spatial network is not easy for the water industry to predict and anticipate the problems. There is a great deal of focus on meeting the primary health standards of the *SDWA* and rightly so, but for smaller utilities R&D, extra monitoring is not undertaken thus when problems emerge, it becomes a reactive cycle. When and where will lead show up in your glass of water are difficult questions to answer.

Biofilms which support *Legionella* is also not well described in most water systems. *Legionella* infections only come from piped water, it is a waterborne disease. But often we do not know where exactly the bacteria are impacting the public. While cooling towers have often been the primary culprit, water fountains and shower heads have also been implicated. Often the disease shows up in those most vulnerable and hospitals are definitely at risk, and thus water systems in hospitals require specific attention.

- There are enough data to better define the problems but all of the information has not been pulled together and synthesized. This includes public complaints, water quality data from the recent lead monitoring, as well as *Legionella* infections. This would include disinfection residuals, heterotrophic bacteria counts, as well as iron and other water quality parameters. If there is to be efforts to fix any of the pipes and distribution system that means that mapping of the lead data as well as the other water quality information is needed.

3. What water quality testing should be done?

Water testing is one in which the issues of i. where you sample, ii. when you sample, iii. how you sample and iv. how many samples you take influence the results. One can bias the results by taking too few samples and by sampling at a place and time when the results are likely to be high or low. It is clear that the citizens of Flint wanted their water tested as 252 kits were returned out of 300 to Dr. Marc Edwards. The methods used by Dr. Edwards follow those recommended by the *Lead and Copper Rule (*USEPA).

The water testing in Flint needs to be diagnostic not focused on a regulatory goal. This means more extensive testing is needed to identify the issues and

problems. I stated in an email January 22, 2015, to Mr. Howard Croft, the mayor and other officials "I definitely think more testing for hardness, iron, TDS, *E.coli* maybe lead from people who are having aesthetic issues is needed."

Added to this list would be corrosivity, heterotrophic bacteria and *Legionella*. The sampling should be targeted to where they think the problems are and enough samples in time and space need to be collected to ensure the negative result is meaningful.

4. How can the state help the citizens of Flint?

There is a need for an immediate solution as well as a long term repair. Because this is a public health issue the MI Department of Community Health should immediately assist the county health unit. All citizens effected should be provided with filters that remove lead. This I believe was done in Lansing. Water can be bottled at the plant and provided to those who need potable and wholesome water. Work should begin immediately to address *Legionella* in hospitals and other buildings where vulnerable people are at risk. Dr. Janet Stout would be extremely helpful in this regard.

More testing is needed. Things again will calm down during the winter months as things warm up in 2016 the problems could re-emerge.

The state revolving funds should be used and emergency/disaster funds requested as this is a public health issue.

It is not clear how fast the water quality will improve if Flint begins using Lake Huron water either from Detroit or as their new intake is built. This should be investigated.

Long term a full assessment of the distribution system is needed. It will take time and money to restore the piping system thus the worst areas should be tackled first. Thus a plan that establishes a priority based on age of the distribution system and water quality should be formulated along with the timeline.

5. How do we restore water quality and wholesomeness, protect public health and restore confidence?

Flint is an example of what many cities may be facing in the future. New sources of water are needed for many locales either due to scarcity growth or cost. The aging infrastructure has already been noted by the American Society of Civil Engineering. In particular distribution systems need to be rehabilitated which means that time and money must be spent on assessment and then "fixing" the problems. This crisis is an opportunity to

step up and do the right thing for City of Flint and for the State. Just as the *Cryptosporidium* outbreak in Milwaukee led to changes at the national level for safe drinking water, it also led to significant changes for the city and now they have emerged as a leader developing the Global Water Center http://www.thewatercouncil.com/global-water-center/. In Canada the outbreak of *E.coli* 0157H7 and *Campylobacter* led to changes in groundwater rules throughout the provinces and the Walkerton Clean Water Centre https://www.wcwc.ca/en/.

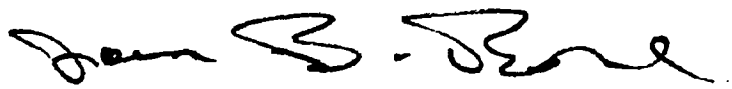
These tragedies where whole communities were effected and children died as a result of water contamination were not associated with some failure of "Standards" but a failure to examine the data, address new emerging concerns/contaminants and to pay attention to management of the water treatment processes.

To rebuild confidence will take years along with honest communications and some short term immediate help for the citizens of Flint.
The state should put together an Independent panel that could address the short term and long term assessment and solutions not just for Flint but for other cities. How can addressing the problems in Flint facilitate the Michigan water strategy?

I hope that this short write up helps.

Please let me know if you have any further questions.

Sincerely,



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Pregnant Woman

If you are exposed to lead when pregnant, the lead can be passed on to your fetus, possibly causing:

- premature birth
- a smaller baby
- learning difficulties
- slower growth in young kids

Healthy Adult

You are at lower risk of health problems from small amounts of lead.

Most health problems that come from lead in adults are because they are exposed to a lot of it at their job - whether they are in painting or construction or work at a factory where lead is used in a product.

If you work with lead, you should have regular blood tests to make sure you're not getting too much into your body.



Kids

Even small amounts of lead can harm kids' health. Your doctor can do a simple blood test to find out if your child has been exposed to lead. Some possible signs of lead poisoning include:

- a bad stomachache
- muscle weakness
- paleness (caused by anemia)

Over time lead can affect a kid's

- brain development
- growth rate

How Does Lead Get Into Your Body?

Eating and breathing lead dust is the most common way lead gets into your body.

- When kids accidentally eat lead, up to 50% can be absorbed into their bodies, compared to 3 to 10% for adults. This is why protecting kids from even small amounts of lead is important.

Lead does not absorb into your skin quickly or at high levels.

- The CDC reviewed a study where a cream with high levels of lead was put on the skin of adults. The cream was left on their skin for 12 hours. The amount of lead that soaked into their skin was very, very small (less than 0.3 percent).
- Taking a shower or bath in water containing lead at levels found in most tap water in Michigan is unlikely to be a problem for anyone, including kids.

Gentlemen,
I understand the demands being placed on you today regarding the vote in Lansing on the water funding, so thanks for trying to accommodate us with this alternate approach.
I'm interested in giving you the opportunity to respond to the most critical evaluations of the state's handling of water issues in Flint. To do that, I think it would be helpful to break the subjects into time periods: decisions made before the switch to the Flint River and decisions made after the switch.

Before the switch…

1. With Flint under the control of an emergency manager in the years leading up to the use of the Flint River as a water source, what role did DEQ play in arriving at the decision?

   DEQ offered technical counsel on what it would take for the city to use the river as its primary water source. Required facility updates, etc.

   Were the department's experts consulted on issues such as: the feasibility of the river as a drinking water source, the river water's effect on Flint's delivery infrastructure, etc.?

   No.

   Was the department pressured in any way to sign off on this arrangement from higher up – the governor's office?

   Unequivocally, no. And we did not have 'signoff authority'. This was a local decision. DEQ's role was to make sure the finished product meets safe drinking water standards.

2. Was the Flint River's water tested prior to the decision to switch to determine several key factors? Those include: compatibility with Flint's delivery system, the need for corrosion controls, etc.?
   Not aware that the city tested for those things. Again, out of 90 + contaminants monitored, corrosivity is not a regulated aspect of drinking water under state and federal law.

3. What legal responsibility did the state have in requiring corrosion controls for the Flint River water? Did the state meet its responsibility for that requirement?

The DEQ felt we followed the appropriate federal protocol and steps, requiring two rounds of sampling and determining that more corrosion control was in order. But this is a question that likely will be addressed by the independent After Action Review team the Governor has called.

4. Detroit Water and Sewerage Department officials used phosphates for corrosion control when running its water through Flint's infrastructure for years prior to the switch. Why was phosphate not included from the start as a protective measure?
   The New Source protocol the DEQ followed was to send Flint through two rounds of testing to determine if further controls were needed. We determined, based on the results of those samples, that more was needed, and directed the city to do that.

   Was a cost estimate done on the use of phosphates and was that part of the decision-making process on whether to use it or not?
   I'm not aware that a cost estimate was done. Cost is not a determining factor we use in drinking water protection.

5. Dan, you've stated in the past that lime was utilized as a form of corrosion control when the switch was made. Marc Edwards has publicly suggested that the use of lime, when coupled with the addition of acid to reduce ph, actually increases the corrosivity of the water. Was the effectiveness/safety of lime as corrosion control tested ahead of time? If not, why?

   Lime softening was used to address the hardness of the water. While this has an impact on reducing corrosivity by reducing pH, it is not the same as a formal corrosion control optimization strategy. Testing bore that out, and the state communicated to Flint that the city needed to finalize its corrosion control strategy.

After the switch...

1. From the outset, there were complaints about the water, ranging from contact rashes and itching, to taste, smell and discoloration. And early on, the city had to deal with Trihalomethane problems. Should these complications have been seen as an indication that there may have been other problems?

The City of Flint's drinking water system suffers from a lack of maintenance stretching back decades. Approximately half of the 500 miles of cast iron pipes in this system are beyond their service life. Hydraulic function of the system is affected by valve problems and service load challenges (it was built to serve far more people than it presently does). While we did receive some reports about aesthetic conditions, follow-up with the city determined that its response and outreach was struggling to pinpoint or validate water quality complaints. The TTHM issue is completely separate from the lead issue.

Should it have triggered a more thorough investigation of the water situation in Flint which might have led you to the lead problem?

No. Looking back, we can safely say that water produced by the City using the river seemed to be shocking an infrastructure that long ago had adjusted to receiving Detroit water, but the water produced at the plant was – and is – meeting all the criteria under the safe drinking water act.

2. In October 2014, General Motors opted to go off Flint's water system because concerns about its corrosive effect on metal. Should that have been an indication that a greater investigation into the water's safety should have been conducted? If it's not good for GM, should someone have asked if it was good for residents?

   City plant operators were using increased chlorine to address organics in the water system (this was prior to the installation of the new filtration system, and an adjustment that precipitated the TTHM increases). The company made its move without consulting the DEQ. It was presumed that the added chlorine in the water was impacting its usefulness to General Motors' needs. It's not fair to say GM's needs for steel products are the same as drinking water standards.

3. In December 2014, January 2015, you had the results of six-months of water sampling which produced a reading of 6 ppb – just over the acceptable level of 5 ppb. Should that alone have triggered some additional system-wide investigation?

Understand that the regulatory framework is a range. The low side is 5 ppb. The threshold for triggering full optimization is 15 pbb. A 90th percentile of 6 pbb is not uncommon or alarming in this program. A 90th percentile over 5 pbb for two consecutive tests simply requires the operator to move to the next step, which is finishing a corrosion control optimization plan. When the second set of samples came back at 11 ppb in the 90th percentile, the state communicated to the city that it should move forward with finishing its corrosion control plans.

4. In February, water samples were taken at the home of Lee-Anne Walters that showed extremely high amounts of lead in her drinking water. I realize the physical dimensions of that home's tie-in line may have played a role in those readings, but again, in the context of what was happening, should that have triggered a system-wide investigation?

   The Walters home was seen as an outlier. The numbers there ranged into very high values, and were a signal that something unusual was very likely happening. After the EPA, DEQ and City of Flint investigated and the City subsequently removed the lead service line, the problem was reportedly solved.

5. As evidenced by the Pat Cook email dated May 1, 2015, it appears EPA's Miguel Del Toral had unofficially expressed his concerns about the river water interacting with the system some time in April. His follow-up unofficial memorandum was dated June 24. So at this point, an expert on drinking water is telling DEQ there is a potential problem here. Why did this not trigger a closer look?

   It did. Conversations with his supervisors at EPA Region Five in Chicago commenced shortly thereafter, and Mr. DelToral deserves credit for bringing some very important points forward.

   It is important to note that the June 24 memo was never officially sent to the DEQ, or finalized by the EPA. It was shared with the homeowner, who shared it with the ACLU, who shared it with the media. This resulted in a conference call between DEQ and EPA in early July, wherein the issues raised in the memo were the focus of

conversation. The DEQ reviewed what it was working on, and EPA offered counsel on what to do next.

6. Around that same time, Virginia Tech's Edwards makes public his findings about the heightened corrosivity of the Flint River water. Why wasn't this a trigger for a possible system-wide investigation? In retrospect, was the state's public response to those findings acceptable?
   At the time, Dr. Edwards brought his findings to the media, but the DEQ – along with state and county public health officials and city water officials – were not aware of how the sampling had been gathered or analyzed, so it was difficult to understand how the findings were achieved. But the news was absolutely concerning. So the DEQ checked with state Department of Health and Human Services, to see if blood lead levels of kids in the area were on the rise. We received word that they were not.

   Looking back, our tone was wrong, no question. We appreciate what Dr. Edwards is working to do, and we've reached out to both apologize and invite his participation in helping to protect Flint kids and families.

7. Dr. Hanna-Attisha's findings that Flint children were exhibiting higher-than-expected levels of lead in blood tests are released on Sept. 24. In response, Brad's response was that the water is "safe" and that it was "meeting state and federal standards." How do you assess that response now?

   In context, the public statement is that the water leaving the plant was safe and meeting standards, but customers with lead service lines or home plumbing may have a concern. But, again, it is clear that our tone was wrong early on with Dr. Attisha's findings.

   We were very glad she met with the state's top epidemiologists at DHHS and presented her findings, because that was the turning moment for this conversation – scientists looking at specific spikes in some Flint zip codes that weren't as visible in the city-wide data. It was what the state needed to take the immediate, near-term and

long-term steps that were enacted quickly, in the form of the Governor's 10-point plan.

8. How do you respond to people who see the state's handling of Flint's water issues as a failure that put the public's health at risk? And has that handling compromised the director and department spokesman in their ability to do their jobs?

We recognize there is a lot of fear in Flint right now, as well as diminished trust. We understand that our ability to earn back the confidence and trust of residents in Flint will be founded on actions, not words. And we would encourage everyone to be patient as the plan we are committed to takes shape in the community.

- The near-term availability of lead filters is a precaution that protects the community while we further assess the system.
- The move to return to Detroit water will bring near-term public confidence, a more manageable water source and less shock to the water supply system when Flint shifts to Karagnondi next year.
- The work planned shortly to inspect and test all schools in Flint will help parents and students feel more confident that they are not exposed to lead there.
- Offering free water testing not only gives residents important information to help them make choices, but provides important system information to the City water system operators.
- The state's commitment to replacing lead service lines will be permanent, final solution to the problem.
- Boosting lead education programs will help everyone become more educated and aware of how to assess and respond to lead concerns in themselves and their children.

It's important for us to say this – the state DEQ has learned a lot about this issue and is absolutely committed to protecting public health. We want to learn from this experience, and we're moving forward with a clear commitment to protect Flint and the rest of the state. Lead is a serious issue, and we are taking it very seriously.

DEQ's 18 Point Partnering Plan

1. **After Action Plan (FAQ) will be ready by noon November 16, 2015**
    - First version complete – updated as needed

2. **School Test Data**
    - School reports to be expedited
    - Steve Busch creates summary reports
    - George Krisztian creates summary spreadsheet
      Essentially Dan & Karen Board on also 11/5/15

3. **Blood exposure**
    - DHHS is lead on providing data

4. **Meeting with Mayor Karen Weaver**
    - Harvey Hollins lead – Dan Wyant, Jim Sygo and George Krisztian to attend
      Meeting held 11/5/15

5. **Messaging our Partnering Plan**
    - Provide ongoing public updates regarding Governor's 10 point plan
    - Continue emphasis on the availability of free testing for Flint residents
    - OEA to direct the Public to the "Flintwater" website

6. **Sampling Protocol**
    - Establish alignment with EPA Region 5 on sampling protocol

7. **Lead service line replacement**
    - Expand RLF directed at lead service line replacement
    - Amy Epkey, Maggie Pallone and Sonya Butler

8. **Partner with EPA**
    - Jim Sygo → Bob Kaplan
    - Dan Wyant → Susan Hedman
    - Mike Prysby and Steve Busch → Darren Lytle and Mike Schock
    - George Krisztian → Tom Burke
    - ODWMA Staff → EPA Region 5 Staff (Jennifer Crooks and Tom Poy

9. **Meet with Mott Foundation to discuss Lead Service Line Identification Study**

10. **Lead Education Program**
    - DHHS is the lead on Lead Education Program

11. Moving KWA forward

- Proactive meetings with KWA

12. Participate actively with Technical Advisory Council

13. Utilize Joan Rose and MSU water expertise Met with Joan on 1/20/15

14. Public Outreach

- Mayor Karen Weaver — Met with Mayor Weaver on 12/3 & 12/4
- Genesee County Health Department — Sent out Contract for Services; scope of meeting to discuss what needs to be done to alert Health Advisory
- Drs. Lawrence Reynolds, Eden Wells and Matthew Davis
- Ministers
- Land Bank
- Legislators
- Citizens

15. Outreach to schools

- EPA guidance on testing
- Work with state superintendent
- ODWMA Staff to work on Literature

16. Make recommendations to EPA about LCR

17. Compliance Communication letter sent November 9, 2015

- Wait until after Dec 30th

18. Enhance Coordination with Health Officials regarding personal health notifications of drinking water issues.

Actions
- Release of Flood Lead Data
- Pre Release of Evacuation Data
- Signing of Power Easement (Bill)

11/30 - 12/1 Events
- Meeting w/ Jane Rose (Mon)
- Meeting w/ Governor (Fri)
- Meeting w/ Federal Team (Thurs)
- Meeting with Mayor Nassau & Alex (Fri)
- Dan Interviews (Thurs)

Mark Bovey
School for the Deaf

City of Flint Drinking Water

Outline prepared by the

Michigan Department of Environmental Quality for the

Flint Water Task Force

I. Introduction

This document is intended to provide an overview of Michigan's implementation of the Safe Drinking Water Act with respect to events in the City of Flint.

II. Background

1. How has Flint historically obtained its drinking water?

The water system in Flint, Michigan, was organized and built under private ownership in 1883 as the Flint Water Works Company to pump raw water from the Flint River to their consumers. In 1903, the system was converted to a municipally owned corporation which supplied drinking water to the City until 1967, when the City switched and become a customer of the Detroit Water and Sewerage Department (DWSD) system. After the switch to DWSD, the city of Flint operated their water treatment plant as a standby, backup emergency plant for purposes of reliability in the event that the single pipeline from DWSD was out of service for any reason.

In 2009, the water treatment plant was operated in this emergency capacity in two instances (dates/number of days). As a backup emergency plant, the city was required to operate the plant quarterly to demonstrate the ability to produce safe water in accordance with Michigan's Safe Drinking Water Act (1976 PA 399) and to keep mechanical equipment in good working order, such as valves, rubber seals, etc. Each time the plant was test run quarterly, samples were taken of raw water quality (describe here) and of finished water (post-filters). Treated water was not put into the distribution system during these test runs, but rather was discharged to the river in accordance with a NPDES Permit (confirm with Steve). The test runs were for demonstration purposes only and to keep the plant operational and staff familiar with operation in the event it was needed in an emergency.

2. What State and Federal laws or rules must be complied with in order to ensure safe drinking water is provided to Flint residents?

The federal Safe Drinking Water Act (SDWA) is the primary law that ensures the quality of Americans' drinking water. Under the SDWA, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.

The federal SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. (SDWA does not regulate private wells which serve fewer than 25 individuals.)

The federal SDWA authorizes the United States Environmental Protection Agency (US EPA) to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. US EPA, states, and water systems then work together to make sure that these standards are met.

Originally, the SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

The most direct oversight of water systems is conducted by state drinking water programs. States can apply to US EPA for "primacy," the authority to implement SDWA within their jurisdictions, if they can show that they will adopt standards at least as stringent as US EPA's and make sure water systems meet these standards. Michigan adopted the Safe Drinking Water Act in 1976 and maintained primacy for the program since 1978?

3. **What is EPA's role as a regulatory agency in implementing the SDWA?**

Federal and state governments share responsibility for administering drinking water programs. Under the Safe Drinking Water Act (SDWA), the U.S. Environmental Protection Agency (US EPA) is given the responsibility for developing national standards and regulations that apply to the nation's public drinking water systems and enforcing those standards.

Michigan's drinking water program is reviewed annually by U.S. EPA.

4. **What is DEQ role's as a regulatory agency in implementing the SDWA?**

SDWA also allows states to accept oversight of the drinking water program under an agreement with US EPA giving states primary enforcement (or primacy) responsibilities. In addition to this delegation of federal authority to the states, states also have the power to create additional regulations and programs governing drinking water suppliers through their own legislative and regulatory processes.

The DEQ has primary enforcement authority in Michigan for the Safe Drinking Water Act under the legislative authority of the Michigan Safe Drinking Water Act (Act 399). As such, the division has regulatory oversight for all public water supplies, including approximately 1,425 community water supplies and 10,000 noncommunity water supplies.

The State of Michigan DEQ engages in a variety of activities to help water systems remain in, or return to, compliance. These activities include: visiting water systems and reviewing their facilities, equipment, and operations; requiring the submission of plans and specifications for waterworks system improvements and issuing construction permits; providing for the examination, certification and regulation of persons operating water supplies; helping systems invest in preventive measures; providing financial assistance for system improvements; and conducting training sessions.

5. What is Flint's role in implementing the SDWA?

These federal and state programs are separate from the activities performed by water systems. State and federal programs develop regulations and perform oversight and compliance activities, but do not actually treat or deliver water to customers. At the local level, public and private water utilities collect, treat, and deliver drinking water to consumers.

To ensure that drinking water is safe, SDWA sets up multiple barriers against pollution. These barriers include: source water protection, treatment, distribution system integrity, and public information. As a public water system, the city of Flint is responsible for ensuring that contaminants in tap water do not exceed the standards. The City treats the water, and must test their water frequently for specified contaminants and report the results to the State. If a water system is not meeting these standards, it is the water supplier's responsibility to notify its customers.

The SDWA recognizes that since everyone drinks water, everyone has the right to know what's in it and where it comes from. The City of Flint, like all water suppliers, must notify consumers quickly when there is a serious problem with water quality. Water systems serving the same people year-round must provide annual consumer confidence reports on the source and quality of their tap water.

The city of Flint submits samples of their water for laboratory testing (monitoring) to verify that the water they provide to its residents meets all federal and state standards. How often and where samples are taken varies from system to system and contaminant to contaminant. The State provides an annual monitoring schedule to the City setting forth these requirements.

In addition, the city of Flint is required to maintain on staff, certified water operators that are trained and experienced to operate the treatment and distribution system associated with the city's water system.

III. The Flint River – it is a safe source of drinking water?

In Michigan, we are blessed with high quality drinking water sources. Seventy percent of Michigan's population receives its drinking water from surface water sources, most with intakes in the Great Lakes. A handful of public water supplies in Michigan do treat water from inland sources such as rivers or groundwater under the influence of surface water. While river sources present a greater challenge for

[Our impression is that the average citizen is under the impression that the river water is corrosive and contains lead – we can address no lead, chloride, and lime issues. Address treatment issues to show that water leaving the plant meet all SDWA

requirements. Ph was same as DWSD. Also sets up point that problems arose after water left plant and was disseminated throughout system]

IV. E. Coli and Total Coliform bacteria violations

1. What caused the E.Coli and Total Coliform bacteria violations experienced by Flint in August-September 2014?

A number of factors, not one specific cause, likely contributed to the Boil Water Advisories (BWA's) in the City of Flint during August and September 2014. While use of the Flint River increased the amount of natural organic matter in the City's water, the City's water treatment plant (WTP) performed well above treatment requirements for organic carbon removal. In addition, less than 20% of the water system was included in the advisory area. If treatment had been compromised, detections would have been widespread throughout the City, rather than in such a localized area.

The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of cast iron piping. Cast iron pipe is subject to internal corrosion, called tuberculation, which causes buildup on the pipe interior leading to water quality issues, reduced flow and pressures, and leakage. Tuberculation also encourages the development of biofilms, layers of bacteria that attach to the interior pipe wall. Biofilm growth is common in areas of piping with little or no disinfectant residual, and together with tuberculation can clog water lines to the point of insufficient water pressure.

The City has also experienced decades of a declining user base and water use associated with vacant homes, commercial businesses and industrial property. Declining water use leads to excess residence time within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and disinfectant residual degradation. While the City has recently seen an infusion of funding for blight removal, contractors completing this work have been improperly using fire hydrants, causing hydraulic disturbances that dislodged and suspended settled debris, which may have contributed to the bacterial contamination.

The winter of 2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30%, saw even greater losses since February due to an increase in cold weather related water main breaks and leaks. The City lacks a formal maintenance program for its over 7,250 valves, which would normally be used to limit impacts during break repairs. Two valves on the transmission line used to supply the area of the BWA were found to be closed during the City's investigation, causing longer residence time, reduced disinfectant residual, reduced flow, and reduced pressure.

The BWA's also occurred during the warmest and for 2014 relatively wet periods of August and September. Warm weather conditions are not only more conducive to bacterial growth but also degrade the water's disinfectant residual carried out from the WTP more quickly. Longer residence times, biofilms, and tuberculation also contribute to disinfectant residual degradation. Warm wet weather conditions also allow water contaminated with bacteria to pool around piping with leaks and breaks.

During the summer, the city was actively repairing the distribution system. After the switch to the Flint River, it was discovered that there were many broken or closed valves in the city's distribution system. As the city began correcting this problem they did experience issues of bacteria in the distribution system as a result of the repairs. This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

2. How were the violations detected and what was DEQ's response?

The Boil Water Advisories (BWAs) which occurred in the City of Flint were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the City of Flint collaboratively in consultation with the DEQ.

Regulations regarding monitoring and standards for bacteria in water distribution systems were developed by the EPA, have been in effect since 1990, and incorporated into the Michigan Safe Drinking Water Act. There are a variety of bacteria, parasites, and viruses which can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, water systems test for Total coliform and E.coli. Total coliform bacteria react to water treatment in a manner similar to many pathogens. Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system minimizes the likelihood that pathogens are present. E.Coli is itself a pathogen, and its detection would be direct evidence of a health risk.

Once a BWA has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Using the most common analytical method, samples must be incubated for a period of 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a BWA. Adding each of these steps together, a normal response period to cancel a BWA under these circumstances would be expected to take at least 3 to 4 days.

A BWA was issued from August 15–20, 2014, for a portion of the City of Flint due to localized detections of total coliform and E.Coli bacteria. Another BWA was issued from September 5-9, 2014, due to localized detections of total coliform bacteria in the same and adjacent portions of the City of Flint. The advisory covered an area approximately 6 square miles. The City of Flint has a total land area just over 34 square miles.

V. TTHM violations

1. What caused the TTHM violations experienced by Flint beginning in late Summer 2014?

TTHMs and HAA5s are the result of organic material in the water reacting with disinfectant used to treat the water. The Flint River has higher levels of organic material than water in the Great Lakes and it was not a surprise that the water produced by the city of Flint developed higher disinfection by-products than the water provided by DWSD. However, because the water treatment plant was previously operating intermittently as an emergency backup supply, it was not possible to predict disinfection byproduct formation until the city began relying on it continuously.

2. How were the violations detected and what was DEQ's response?

In preparation to rely on the Flint River, the city installed ozone to help reduce the organic material (known as precursors), but additional measures were necessary. Because TTHM and HAA5 MCLs are calculated based on a running annual average at a specific location, the city didn't actually violate the safe drinking water act standard until the fall, but because it was apparent in the summer of 2014 that the standard would eventually be exceeded, the city was asked to proactively implement measures to address the problem before the violation required them to do so. The city added granular activated carbon to their filters (after receiving a construction permit from DEQ on date?) and levels of TTHMs and HAA5s were reduced. The city returned to compliance with the running annual average (MCL) on September 1, 2015.

IV. The taste, odor, and smell complaints received by Flint

1. What caused the taste and odor complaints received by Flint from residents?

Taste and odor issues are very personalized. Some water systems receive complaints because of too much disinfectant. In Flint, during the summer after the switch to the Flint River as a water source, taste and odor complaints increased. It was believed at the time to be the result of changes in hydraulic conditions within the distribution system. Water leaving the water treatment plant did not have any unusual odor or color. However, construction in the distribution system, hydrant flushing and changes in flow characteristics are all know causes of disturbances with the distribution system that can cause an increase in taste and odor complaints.

2. What was DEQ's response?

DEQ consulted with the city regarding these complaints. The city indicated that they were offering testing for anyone that had issues and that they were not able to verify the complaints. Jugs of discolored water were being brought to meetings, but city personnel were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHM's, it was anticipated that there would be short term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) can and will cause temporary problems as described. Based on information from the city personnel, it appeared that the complaints were related to operational activities occurring in the distribution system.

V. The lead issues in the Flint drinking water

1. What causes lead in drinking water?

Lead is rarely found in source water, but enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead pipes, fixtures and solder. The most common problem is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially hot water. Lead can leach into water from pipes, solder, fixtures and faucets (brass), and fittings. The amount of lead in tap water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the pH of the water, and its temperature.

2. What are the lead action levels?

For most contaminants, EPA sets an enforceable regulation called a maximum contaminant level (MCL) based on the MCLG. MCLs are set as close to the MCLGs as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies. However, because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, EPA established a treatment technique rather than an MCL for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to ensure control of a contaminant. The treatment technique regulation for lead (referred to as the Lead and Copper rule) requires water systems to control the corrosivity of the water. The regulation also requires systems to collect tap samples from sites served by the system that are more likely to have plumbing materials containing lead. If more than 10% of tap water samples exceed the lead action level of 15 parts per billion, then water systems are required to take additional actions including:

•Taking further steps optimize their corrosion control treatment (for water systems serving 50,000 people that have not fully optimized their corrosion control) .

•Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.

•Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

3. Are there any safe levels of lead?

The SDWA requires EPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. These non-enforceable health goals, based solely on possible health risks are called maximum contaminant level goals (MCLG) The MCLG for lead is zero. EPA has set this level based on the best available science which shows there is no safe level of exposure to lead.

4. What is the LCR?

Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. On June 7, 1991, EPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR).

The treatment technique for the rule requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 15 ppb or copper concentrations exceed an action level of 1.3 ppm in more than 10% of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the action level for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control.

5. Did DWSD have a corrosion control plan?

After the LCR was passed, DWSD conducted two rounds of monitoring at for lead and copper. Copper levels were well below action level limits; but lead levels exceeded the action level of 15 parts per billion in many of their customer communities. As a result, DWSD needed to install corrosion control treatment. DWSD performed a corrosion control study and concluded that they could reduce the corrosivity of the water by the addition of an ortho-phosphate.

6. Did DEQ require Flint to have a corrosion control plan in place when it switched to the Flint River as its source of drinking water?

No. The DEQ believed there were two ways under the lead/copper rule to deem a water supply as providing "optimal corrosion control" – either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment. DEQ staff thought it was appropriate to call for the city of Flint to perform two 6-month rounds of monitoring to demonstrate if the city was practicing optimal corrosion control treatment. According to state regulations (R325.604f (2) (iii), a system can demonstrate that it is "practicing optimal corrosion control" by sampling in two, consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the Flint River has 0 ppb lead, the city would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods.

In addition, the city of Flint had been purchasing water from DWSD that was treated for corrosion control. It was DWSD that was considered as having optimized corrosion control at that point. Since the city of Flint had not been the supplier of water before, DEQ did not require the city to "maintain" corrosion control for which it was not responsible. It couldn't "maintain" something that it wasn't doing. As we stated previously, we believed Flint should have been afforded the same opportunity that all other large water systems were

initially granted to demonstrate optimal corrosion control treatment through full scale monitoring. For these reasons, two 6-month rounds of monitoring, as required by the lead/copper rule were felt to be appropriate to determine whether or not optimal corrosion control was being achieved.

7. How does DEQ calculate the 90th percentile?

To determine the 90th percentile of a list of lead or copper results, the following steps are followed:

Step 1: Place lead or copper results in ascending order
Step 2: Assign each sample a number, 1 for lowest value
Step 3: Multiply the total number of samples by 0.9 – this yields the 90th percentile sample. For example: 20 samples x 0.9 = 18th sample. This is the 90th percentile level.

Calculating the 90th percentile is easiest when a supply collects 10 samples (or a multiple of 10). Multiples of 10 require no averaging or interpolation.

8. What was the result of the first round of monitoring conducted by Flint?

The first 6-month round of lead and copper monitoring conducted by the city of Flint ended on December 31, 2014. One hundred samples 100 samples were submitted and the 90th percentile lead level was calculated to be 6 parts per billion.

A 90th percentile lead result of 6 ppb is not unusual. Many water supplies in Michigan and across the country have 90th percentile levels of lead greater than this. Even systems that have installed treatment and are considered optimized by definition can and do have levels above 5 ppb.

9. What was the result of the second round of monitoring conducted by Flint?

The second 6-month round of lead and copper monitoring conducted by the city of Flint ended on June 30, 2015. Sixty nine samples were submitted and the 90th percentile lead level was calculated to be 11 parts per billion. The conclusion from these results was that the city exceeded the level required to be deemed as having optimized corrosion control but did not exceed the action level of 15 parts per billion.

10. What actions did DEQ order Flint to undertake after the second round of monitoring?

While the City's LCR compliance monitoring continued to meet action level requirements, the LCR requires all large systems (those serving over 50,000 people) to optimize corrosion control regardless of their 90th percentile lead concentration. Following receipt of Flint's compliance monitoring results, the DEQ required the city to install corrosion control treatment in correspondence dated August 17, 2015.

Under the LCR, the city has 6 months to let the DEQ know whether it intends to conduct a study, 18 months to perform the study, and 24 months to complete installation of corrosion control. The DEQ has requested the city of Flint to accelerate this schedule. The city submitted plans and specifications to install corrosion control treatment and a construction

permit was issued by DEQ on October 28, 2015. The City is in the process of installing the necessary equipment and procuring the appropriate chemicals. Treatment is expected to be on-line by the end of November.

11. What had DHHS advised DEQ regarding blood lead levels prior to DEQ ordering Flint to implement optimized corrosion control?

In an e-mail dated July 28, 2015, DHHS indicated that they "compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –

- Lead testing rates remained about the same from year to year (chart on the right).
- There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).
- However that pattern was not terribly different from what we saw in the previous three years, especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).
- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspect that the summer data spike may be related to this effect.
- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015."

Insert GRAPHS?

This e-mail in concert with the completion of two 6-month rounds of lead compliance sampling data indicating that the City of Flint had not exceeded an action level for lead provided the basis for DEQ to maintain that the water in Flint continued to be in compliance with the SDWA and was safe for consumption.

12. When did DEQ first become aware of allegations of elevated blood levels being detected in certain children?

The DEQ was notified on August 23, 2015 by a professor from Virginia Tech that "over the next few months we will be studying Flint water quality issues..." and similarly notified by U.S. EPA on August 28, 2015. Results indicating elevated lead levels in homes were reported as part of this study in late August.

By this time, the City of Flint had already completed the required two 6-month rounds of monitoring and a determination had been made by the DEQ that the City must install corrosion control treatment in

[Hurley and Edwards all after the fact]

VI. Questions raised regarding DEQ's actions

1. What was DEQ's response to EPA's inquiry in February 2015 regarding the optimized corrosion control treatment being implemented by Flint under the LCR?

DEQ indicated that the city was in compliance with the lead/copper rule. 90th percentile levels were below the Action Level and not unusual. The city was already conducting the second round of monitoring which would provide for a determination of whether or not second round of monitoring which would provide for a determination of whether or not additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the lead/copper rule that lead or copper results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile action level in the rule.

2. Did DEQ attempt to mislead EPA in a February 27, 2015 email responding to EPA's inquiry regarding OCCT?

No. There is an e-mail from Steve Busch indicating that the city was practicing corrosion control. This was a misstatement. What was meant was that the city was performing the required monitoring to determine whether or not they were "practicing optimal corrosion control". It was clarified in follow-up telephone conversations with EPA.

3. Has EPA subsequently admitted that the LCR is subject to differing interpretations such as that presented by DEQ?

On November 3, 2015, U.S. EPA issued a Memorandum regarding the "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems". This memorandum addresses concerns raised about the application of the LCR, specifically the requirements pertaining to maintenance of optimal corrosion control treatment, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. The memo states that this type of situation rarely arises, that the language of the LCR does not specifically discuss such circumstances, and that there are differing possible interpretations of the LCR with respect to how the rule's optimal corrosion control treatment procedures apply to this situation. The memo is intended to clarify prospectively steps agencies should take/apply in the future.

4. Did DEQ reject any of the samples submitted by Flint?

Yes, samples at two locations were excluded from the compliance calculation.

Compliance samples must be a first draw, 1 liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted sampling sites, called tier 1 sampling sites. For a municipality such as the City of Flint, the tier 1 sampling pool must consist of single family structures that are:

- served by a lead service line,
- contain lead pipes, or
- contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

Furthermore, if a community has tier 1 sites that contain lead services, they are required to have at least 50% of their compliance samples collected from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters, etc. One of the samples submitted by Flint that was excluded from the 90th percentile compliance calculation in the latest monitoring period was taken from a tap at a non-residential site, and the other sample result that was removed was collected from a single family home that has whole house treatment system (check with Steve). Both of these sites are therefore statutorily excluded from the compliance consideration. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point of use or point of entry treatment can only be used if the community has insufficient tier 1 sites available.

5. **Did DEQ review the information submitted by Flint to ensure all samples were from Tier 1 sites?**

6. **Did DEQ believe the levels of lead found at 212 Browning in April 2015 were indicative of a system-wide problem?**

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The reason for this connection is unknown. The city replaced the lead service line. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem. Subsequent sampling taken at this address showed that replacement of the service line mitigated the problem. There was also no reason to believe that this was indicative of a system-wide problem.

7. **Do DEQ's sampling instructions comply with the LCR?**

8. **Does DEQ require the use of small-neck bottles to obtain samples?**

9. **Why was Flint required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?**

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of the Michigan SDWA.

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples Flint was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census (check with Steve), which listed the city's population as more 100,000 residents. In March of 2015, the city provided an updated census that indicated the city's population had decreased to less than 100,000 (check with Steve). Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

10. Why did DEQ admit it made a mistake?

Shekter Smith, Liane (DEQ)

From: London, Bob (DEQ)
Sent: Wednesday, October 14, 2015 1:12 PM
To: Bloemker, Jon (DEQ); Shekter Smith, Liane (DEQ); Benzie, Richard (DEQ)
Subject: Bay City/Bay Area WTPs, Lead and Copper history
Attachments: BayCityPbCu.xlsx

Jon,

Attached is a printout of lead and copper 90th percentile results since 2004. That's as far back as they are entered in SDWIS. Rebecca offered to get you the 2000-2004 data if you want it, but our relevant actions began in about 2006.

Here is a timeline of events:
1992 – DEQ notified City of lead/copper rule requirements (Dave Timm letter indicates agreement for a modified consecutive monitoring approach)
1992 – Lead action level was exceeded in first round of monitoring, appropriate follow-up activities took place
1993 – Letter from Bay City (will conduct corrosion study, want to switch to a single, consecutive system for compliance)
1996 – Desktop Corrosion Analysis recommends PO4 addition, and DPH (now DEQ) concurs (deadline to install set at 12/31/97)
1996 – Letter from City requesting approval to pilot-test a switch to ferric sulfate as its primary coagulant (corrosion control goal is to have a finished water Chloride to Sulfate ratio of 0.6 or less based on AWWA paper and consultant's recommendation). I cannot locate any correspondence from DEQ agreeing to this requested change, but it appears to have taken place.
1997 – March meeting notes/memo from consultant indicating that bench test results from the coagulant change were encouraging, and requesting a 6-month full scale test (which would be completed before the 12/31/97 deadline above). I cannot locate any correspondence from DEQ agreeing to this, but the meeting notes indicate DEQ attended the meeting, and as far as I know the City proceeded with this.
1998 – DEQ letter approves single, consecutive system for compliance monitoring
1998 – System meets action level for January-June, exceeds for July-December
1999 – System meets action level for January-June, exceeds for July-Decmeber
2000 – System meets action level for January-June, exceeds for July-December
2001 – System meets action level for both monitoring periods
2002 – System moves to reduced, annual monitoring, and meets action level
2003 – System remains on reduced, annual monitoring, and meets action level
2004 – System remains on reduced, annual monitoring, and exceeds action level
2005 – System reverts to 6-month monitoring and meets action level during both monitoring periods
2006 – System moves to reduced, annual monitoring, and exceeds action level
2006 – DEQ meets with City (11/29). City indicates that they have contacted their consulting engineer to review corrosion control treatment practices.
2007 – DEQ Sanitary Survey requires City to reoptimize corrosion control due to periodic action level exceedances, with report due to DEQ 6/30/09
2009 – Corrosion control recommendations submitted to DEQ (part of the City's Simultaneous Compliance Assessment report), DEQ met with City 12/4, consultant recommended PO4 addition and pH adjustment, DEQ concurs
2009 – December 17 letter establishes PO4 and pH adjustment as the official OCCT, set a 12/31/2011 deadline to install
2010 – December 20 Sanitary Survey confirms that the deadline to install OCCT is 12/31/2011, but gives the City two options – commit to a new raw water source (that has a stable pH) and install PO4, or commit to remain on the current Saginaw Bay source (that has wide variations in pH and alkalinity) and install both PO4 and pH adjustment. The City subsequently chose to switch to a pH-stable raw water source (per their October 25, 2010 letter to us).
2011 – PO4 treatment was installed by the deadline and was ready to begin operation; however, all parties involved agreed that hydrants should be flushed when PO4 treatment began. Due to concerns for cold weather/icing, the City

WSSN	NAME	Mon Prd	Prd Begin	Prd End	Collect Begin	Collect End	Analyte	# Collected	90th (mg/L)
00470	BAY CITY, CITY OF	1YR 2015	1/1/2015	12/31/2015	6/9/2015	6/16/2015	PB90	72	0.004
00470	BAY CITY, CITY OF	1YR 2015	1/1/2015	12/31/2015	6/9/2015	6/16/2015	CU90	72	0.17
00470	BAY CITY, CITY OF	6M 2014-2	7/1/2014	12/31/2014	9/8/2014	9/17/2014	PB90	98	0.0102
00470	BAY CITY, CITY OF	6M 2014-2	7/1/2014	12/31/2014	9/8/2014	9/17/2014	CU90	98	0.3702
00470	BAY CITY, CITY OF	6M 2014-1	1/1/2014	6/30/2014	4/29/2014	5/13/2014	PB90	98	0.003
00470	BAY CITY, CITY OF	6M 2014-1	1/1/2014	6/30/2014	4/29/2014	5/13/2014	CU90	98	0.28
00470	BAY CITY, CITY OF	6M 2013-2	7/1/2013	12/31/2013	9/25/2013	9/25/2013	PB90	97	0.0103
00470	BAY CITY, CITY OF	6M 2013-2	7/1/2013	12/31/2013	9/25/2013	9/25/2013	CU90	97	0.466
00470	BAY CITY, CITY OF	6M 2013-1	1/1/2013	6/30/2013	5/21/2013	6/7/2013	PB90	97	0.004
00470	BAY CITY, CITY OF	6M 2013-1	1/1/2013	6/30/2013	5/21/2013	6/7/2013	CU90	97	0.34
00470	BAY CITY, CITY OF	6M 2012-2	7/1/2012	12/31/2012	9/24/2012	10/4/2012	PB90	97	0.004
00470	BAY CITY, CITY OF	6M 2012-2	7/1/2012	12/31/2012	9/24/2012	10/4/2012	CU90	97	0.293
00470	BAY CITY, CITY OF	6M 2012-1	1/1/2012	6/30/2012	6/1/2012	6/26/2012	PB90	98	0.006
00470	BAY CITY, CITY OF	6M 2012-1	1/1/2012	6/30/2012	6/1/2012	6/26/2012	CU90	98	0.413
00470	BAY CITY, CITY OF	6M 2011-2	7/1/2011	12/31/2011	12/7/2011	12/28/2011	PB90	97	0.011
00470	BAY CITY, CITY OF	6M 2011-2	7/1/2011	12/31/2011	12/7/2011	12/28/2011	CU90	97	0.163
00470	BAY CITY, CITY OF	6M 2011-1	1/1/2011	6/30/2011	4/13/2011	4/19/2011	PB90	97	0.002
00470	BAY CITY, CITY OF	6M 2011-1	1/1/2011	6/30/2011	4/13/2011	4/19/2011	CU90	97	0.052
00470	BAY CITY, CITY OF	6M 2010-2	7/1/2010	12/31/2010	12/2/2010	12/16/2010	PB90	97	0.007
00470	BAY CITY, CITY OF	6M 2010-2	7/1/2010	12/31/2010	12/2/2010	12/16/2010	CU90	97	0.097
00470	BAY CITY, CITY OF	6M 2010-1	1/1/2010	6/30/2010	4/1/2010	4/15/2010	PB90	97	0.006
00470	BAY CITY, CITY OF	6M 2010-1	1/1/2010	6/30/2010	4/1/2010	4/15/2010	CU90	97	0.18
00470	BAY CITY, CITY OF	6M 2009-2	7/1/2009	12/31/2009	12/14/2009	12/14/2009	PB90	97	0.011
00470	BAY CITY, CITY OF	6M 2009-2	7/1/2009	12/31/2009	12/14/2009	12/14/2009	CU90	97	0.153
00470	BAY CITY, CITY OF	6M 2009-1	1/1/2009	6/30/2009	4/7/2009	4/7/2009	PB90	97	0.008
00470	BAY CITY, CITY OF	6M 2009-1	1/1/2009	6/30/2009	4/7/2009	4/7/2009	CU90	97	0.163
00470	BAY CITY, CITY OF	1YR 2008	1/1/2008	12/31/2008			PB90	69	0.0291
00470	BAY CITY, CITY OF	1YR 2008	1/1/2008	12/31/2008			CU90	69	0.321
00470	BAY CITY, CITY OF	6M 2008-2	7/1/2008	12/31/2008	12/17/2008	12/17/2008	PB90	97	0.0113
00470	BAY CITY, CITY OF	6M 2008-2	7/1/2008	12/31/2008	12/17/2008	12/17/2008	CU90	97	0.113
00470	BAY CITY, CITY OF	6M 2007-2	7/1/2007	12/31/2007			PB90	97	0.0113
00470	BAY CITY, CITY OF	6M 2007-2	7/1/2007	12/31/2007			CU90	97	0.123
00470	BAY CITY, CITY OF	6M 2007-1	1/1/2007	6/30/2007			PB90	97	0.008

IS YOUR CHILD SAFE FROM LEAD POISONING?

LEARN HOW TO PROTECT YOUR FAMILY:

CREATE A LEAD SAFE HOME

What causes lead poisoning?

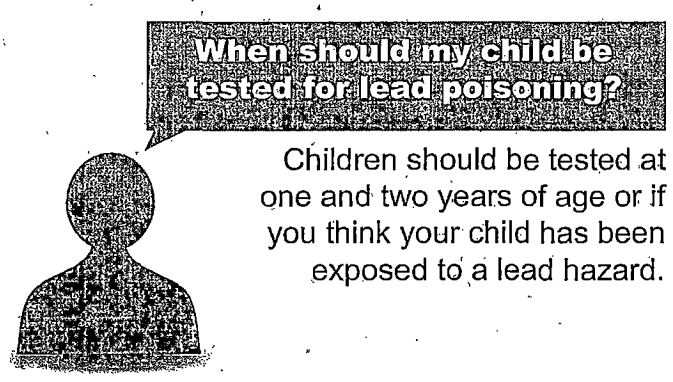
There are many places in a home that can put babies and children in danger of lead poisoning.

Lead paint is the #1 cause of lead poisoning in Michigan and is often found in homes built before 1978. The older the home, the more likely that painted surfaces like windows, cupboards, doors and porches will contain lead paint.

Lead poisoning occurs most often when children come in contact with lead in the air, in dust particles and in lead paint. Lead dust is created when windows are opened and closed, or when surfaces age and paint chips or peels. When dust and chips fall on the floor they get on hands and toys. When a child puts hands or toys in their mouth, they can become lead poisoned.

How can I tell if my child has lead poisoning?

Talk to your doctor about testing your child's blood for lead poisoning.



Children should be tested at one and two years of age or if you think your child has been exposed to a lead hazard.

To learn more about lead poisoning prevention and blood lead testing, call the Childhood Lead Poisoning Prevention Project:

(517) 335-8885

(888) 322-4453

Take this quiz to see if your child may have lead poisoning:

Symptoms of lead poisoning can be silent—and hard to recognize. Preventing lead poisoning before it happens is the best way to keep your family safe. Take this quiz to see if your child may be at risk:

Does your child currently live in a home built before 1950 or have they lived in a home built before 1950 in the recent past? Do they spend time at or often visit a home built before 1950?

Yes No Don't know

Does your child currently live in a home built before 1978 that was recently remodeled? Have they lived in or often visited a home built before 1978 that was recently remodeled?

Yes No Don't know

Does your child have a brother, sister or playmate with lead poisoning?

Yes No Don't know

Does your child live with an adult whose job or hobby involves lead?

Yes No Don't know

Does you or your child's caregiver use home remedies that may contain lead?

Yes No Don't know

If you answered NO to all of these questions, your child is probably not at risk for lead poisoning. If you answered YES or DON'T KNOW to any of these questions, talk to your doctor about testing your child for lead poisoning.

SAFE CLEANING IN YOUR HOME

Use these steps to help keep your home clean and reduce your child's risk of exposure:



Put on gloves. If you do not have rubber gloves, wash your hands well after cleaning.

Use the right cleaners and disposable supplies. Use soapy cleaners or products made to remove lead dust.

Remove paint chips first. Window areas and porches often have peeling paint and lead dust. Pick up visible chips and dispose of them in a plastic bag.



Always wet-mop floors and window sills. Do not broom lead dust. Dispose of cloths after wiping each area. If using a mop, replace water frequently.

When using a vacuum, make sure it is a HEPA vacuum. Some health departments have HEPA vacuums available to borrow.



Rinse after cleaning. Use clean water and a new mop head or fresh paper towels to wipe away suds.

Always empty wash water down a toilet.

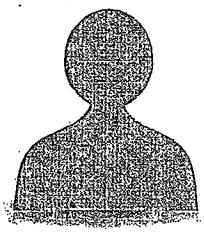


Repeat these steps often when dirt and dust appear on floors, porches, window wells, window sills, stairs and children's play areas.

Note: Areas that should be cleaned include windows, doors, floors, porches, stairs and child play areas.

Important: Do not use your vacuum. It will spread lead dust into the air you breathe.

What can I do to protect my child from lead?



- Wash hands, bottles, pacifiers and toys often.
- Always take off shoes before going into the house.
- Flush your pipes before drinking, and only use cold water for cooking and mixing formula. Flush pipes by running the water for approximately 5 minutes.
- Watch your child's diet. Foods high in calcium and iron help keep lead from being absorbed by a child's body.
- Avoid using power sanders, open-flame torches, heat guns, dry scrapers and dry sandpaper on painted surfaces.
- Fix peeling or chipping paint.
- Use a certified Repair and Remodeling Professional when making updates to your home.
- Practice safe cleaning methods.

Thinking about remodeling your home? Need advice about identifying and removing lead paint? Call the Lead and Healthy Homes Section: 866-691-LEAD.

www.michigan.gov/lead

MDHHS
Michigan Department of Health & Human Services
RICK SNYDER, GOVERNOR | NICK LYON, DIRECTOR

Childhood
LEAD POISONING
prevention program

George can we process to decay?

Suggestions on where to start and what to do:

A reminder – if whole house filters are installed, these homes cannot be used for testing under the Lead and Copper Rule

1. Agree with the City, and opinion-leaders on the acceptable standard for lead levels in the drinking water.
    a. Understanding that there are background levels of lead in any water system, at what level will residents feel the drinking water in their home is safe?
    b. Where to start testing and installing whole house filters.
2. Dr. Mona AH, or someone with health credibility to publically provide this information:
    a. Water is safe for bathing
    b. Water children should be supervised during bathing (no water intake)
    c. Special care when bathing infants
    d. Water is safe for laundry and household cleaning
    e. Plants may be watered, as long as they are not consumed
    f. Pets should not drink unfiltered water
3. Testing
    a. Start with the highest-priority homes
        i. Homes with children under the age of 6 and/or homes with pregnant women.
        ii. Zip codes identified as 48053 and 48054, the zip codes identified in Dr. Mona's study. 48503 & 04 ? CONFIRM & SEND TO EOC STEVE@
        iii. As a condition of installation, homes must agree to monthly water testing and routine maintenance of the installed whole house filters.
4. Wrap around
    a. Health and nutrition Information
    b. Good water use practices
    c. Other lead exposure prevention and source identification prevention measures
    d. Finger-prick testing
    e. Schedule the filter installation

CALL SANDRA WALKER !!!

11.5.24

EH
DEAN
~~HEATHER~~
MARALDO

- MIKE GLASGOW
- TDS METER OR EC?
- LEAD SUPPLY LINE SPREADSHEET
-

Page 1 of 1

Notice of Commencement

1. 01cf001 Rev 157
2. 01dw002 Rev 157
3. 01cf003 Rev 157
4. 01dw004 Rev 157
5. 02cf005 Rev 2157
6. 02dw006 Rev 2157
7. 02cf007 Rev 2157
8. 02dw008 Rev 2157
9. 01dw009 Rev 157
10. 01cf010 Rev 157
11. 01dw011 Rev 157
12. 01cf012 Rev 157
13. 01dw013 1st Fl Dwg Rev Date
14. 01dw014 1st Fl Dwg Rev Date
15. 02dw015 2nd Fl Dwg Rev Date
16. 02dw016 2nd Fl Dwg Rev Date
17. 01cf017 Rev 157
18. 01dw018 Rev 157

19	01DW Ø11	RM 153
20	01CF Ø12	RM 153
21	02DW Ø29	RM 254
22	02CF Ø30	RM 254
23	02DW Ø31	RM 253
24	02CF Ø32	RM 253
25	02DW Ø33	RM 252
26	02CF Ø34	RM 252
27	02DW Ø35	RM 251
28	02CF Ø36	RM 251

Doyle Byler Smith Seaborne

29.	01 Dw 012	R4 152
30	01 CF 013	" R4 152
31.	01 Dw 014	R4 157
32.	01 CF 015	R4 157
33.	01 Dw 037	R4 160 Rear
34	01 Dw 038	R4 157 Rear
35	02 CF 039	R4 260
36	02 Dw 040	R4 260
37	02 CF 041	R4 262
38	02 Dw 042	R4 262
39	01 Lx 043	Main Corridor
40	01 KC 044	Office Trailer

41	02 WC Ø50	Right of Elev.
42.	02 WC Ø51	Right of Elev.
43.	02 KC Ø52	Tellers Lounge
44.	03 WC Ø53	Right of Elev.
45.	03 WC Ø54	Right of Elev.
46	03 KC Ø55	Kitchen
47	03 KC Ø56	Kitchen
48	01 WC Ø45	Hallway
49	01 WC Ø46	Hallway
50.	01 CF Ø47	RM 111
51.	01 KC Ø48	RM 110
52	01 KC Ø49	BM 110

Doyle Rydez Sample Size Issue

53.4% of Dupage Residents

54% of Arlington Residents

53.4% of Du Page Residents

57.4% of Arlington Residents

SAMPNO	Contact	SUBDATE	ACODE	RESULT	REPADD1	REPADD2	REPADD3	INVADD1	INVADD2	INVADD3	Wssn_Pool
LF90454	MIKE	04-Nov-15	PB	0.000	4500 N		FLINT	2484 NOLEN DR	FLINT	48504	2310
LF90456	MIKE	04-Nov-15	PB	0.000	4500 N		FLINT	2105 TUSCOLA ST	FLINT	48503	
LF90457	MIKE	04-Nov-15	PB	0.000	4500 N		FLINT	1217 MAXINE	FLINT	48503	
LF90458	MIKE	04-Nov-15	PB	0.000	4500 N		FLINT	2610 PEWANAGA PL	FLINT	48507	
LF90459	MIKE	04-Nov-15	PB	0.000	4500 N		FLINT	2508 PIERCE ST	FLINT	48503	
LF90465	MIKE	04-Nov-15	PB	0.000	4500 N		FLINT	3905 KELLAR AVE	FLINT	48504	2310
LF90467	MIKE	04-Nov-15	PB	0.000	4500 N		FLINT	2484 NOLEN DR #2	FLINT	48504	2310
LF90468	MIKE	04-Nov-15	PB	0.000	4500 N		FLINT	1680 N CHEVROLET AVE	FLINT	48504	
LF91271	MIKE	09-Nov-15	PB	0.000	4500 N		FLINT	1419 MULBERRY LN	FLINT	48507	2310
LF91273	MIKE	09-Nov-15	PB	0.000	4500 N		FLINT	1715 CRESCENT DR	FLINT	48503	2310
LF91275	MIKE	09-Nov-15	PB	0.000	4500 N		FLINT	718 COLUMBIA LN	FLINT	48503	2310
LF91277	MIKE	09-Nov-15	PB	0.000	4500 N		FLINT	3018 CLEMENT ST	FLINT	48504	2310
LF91278	MIKE	09-Nov-15	PB	0.000	4500 N		FLINT	601 WHITE WILLOW DR	FLINT	48506	2310
LF91280	MIKE	09-Nov-15	PB	0.000	4500 N		FLINT	718 COLUMBIA LN	FLINT	48503	2310
LF91281	MIKE	09-Nov-15	PB	0.000	4500 N		FLINT	718 COLUMBIA LN	FLINT		2310
LF91283	MIKE	09-Nov-15	PB	0.000	4500 N		FLINT	2006 AITKEN AVE	FLINT	48503	2310
LF91285	MIKE	09-Nov-15	PB	0.000	4500 N		FLINT	718 COLUMBIA LN	FLINT	48503	2310
LF91286	MIKE	09-Nov-15	PB	0.000	4500 N		FLINT	3840 GLOUCESTER ST	FLINT	48503	2310
LF91290	MIKE	09-Nov-15	PB	0.000	4500 N		FLINT	3841 LORRAINE AVE	FLINT	48506	2310
LF91291	MIKE	09-Nov-15	PB	0.000	4500 N		FLINT	3614 ALDON LN	FLINT	48506	2310
LF92698	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	2101 WINDEMERE AVE	FLINT	48503	2310
LF92699	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	1963 LAUREL OAK DR	FLINT	48507	2310
LF92702	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	6622 ELMRIDGE DR	FLINT		2310
LF92705	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	2438 MISSOURI AVE	FLINT	48506	2310
LF92712	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	418 E BALTIMORE BLVD	FLINT	48505	2310
LF92713	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	2101 WINDEMERE AVE	FLINT	48503	2310
LF92715	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	313 E LYNDON AVE	FLINT	48505	2310
LF92719	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	4236 KELLAR AVE	FLINT	48504	
LF92722	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	1043 PINEHURST AVE	FLINT	48507	
LF92724	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	822 W HEMPHILL RD	FLINT	48507	
LF92725	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	6310 FLEMING RD	FLINT	48504	2310
LF92726	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	3245 MONTANA AVE	FLINT	48506	2310
LF92727	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	1602 S FRANKLIN AVE	FLINT	48503	2310
LF92728	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	4117 TRUMBULL AVE	FLINT		2310
LF92729	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	3302 GRATIOT AVE	FLINT	48503	2310
LF92730	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	3230 COLORADO	FLINT	48506	2310
LF92735	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	1326 BEARD ST	FLINT		2310
LF92736	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	1214 KENSINGTON AVE	FLINT	48503	2310
LF92737	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	800 E COURT ST #134	FLINT	48503	2310
LF92738	MIKE	18-Nov-15	PB	0.000	4500 N		FLINT	555 S SAGINAW ST STE 201	FLINT	48502	2310
LF91269	MIKE	09-Nov-15	PB	0.001	4500 N		FLINT	2937 CONCORD ST	FLINT	48504	
LF91282	MIKE	09-Nov-15	PB	0.001	4500 N		FLINT	726 W DARTMOUTH ST	FLINT	48505	2310
LF91284	MIKE	09-Nov-15	PB	0.001	4500 N		FLINT	210 W STEWART AVE	FLINT	48505	2310
LF92700	MIKE	18-Nov-15	PB	0.001	4500 N		FLINT	317 BEDE ST	FLINT	48507	2310
LF92701	MIKE	18-Nov-15	PB	0.001	4500 N		FLINT	4629 MILTON DR	FLINT	48507	2310
LF92703	MIKE	18-Nov-15	PB	0.001	4500 N		FLINT	6626 ELMRIDGE DR	FLINT	48505	2310
LF92706	MIKE	18-Nov-15	PB	0.001	4500 N		FLINT	532 BURROUGHS AVE	FLINT	48507	2310
LF92711	MIKE	18-Nov-15	PB	0.001	4500 N		FLINT	3826 BROWN ST	FLINT	48532	2310
LF92714	MIKE	18-Nov-15	PB	0.001	4500 N		FLINT	4515 OGEMA	FLINT	48507	2310
LF90455	MIKE	04-Nov-15	PB	0.002	4500 N		FLINT	1217 MAXINE	FLINT	48503	
LF90461	MIKE	04-Nov-15	PB	0.002	4500 N		FLINT	3741 WORCHESTER DR	FLINT	48503	
LF91270	MIKE	09-Nov-15	PB	0.002	4500 N		FLINT	915 E COURT ST #405	FLINT	48503	2310

LF91274	MIKE	09-Nov-15	PB	0.002	4500 N		FLINT	4221 BROWNELL BLVD	FLINT	48504	2310
LF91288	MIKE	09-Nov-15	PB	0.002	4500 N		FLINT	112 E STEWART AVE	FLINT	48505	2310
LF91289	MIKE	09-Nov-15	PB	0.002	4500 N		FLINT	2601 CIRCLE DR	FLINT	48507	2310
LF92709	MIKE	18-Nov-15	PB	0.002	4500 N		FLINT	3802 GREENBROOK LN	FLINT	48507	2310
LF92716	MIKE	18-Nov-15	PB	0.002	4500 N		FLINT	3825 DAVISON RD	FLINT	48506	
LF92718	MIKE	18-Nov-15	PB	0.002	4500 N		FLINT	4109 TRUMBULL AVE	FLINT	48504	2310
LF92720	MIKE	18-Nov-15	PB	0.002	4500 N		FLINT	932 LYON ST	FLINT	48503	
LF92721	MIKE	18-Nov-15	PB	0.002	4500 N		FLINT	3420 PARKSIDE DR	FLINT	48503	
LF92732	MIKE	18-Nov-15	PB	0.002	4500 N		FLINT	1331 BEARD ST	FLINT	48503	2310
LF90466	MIKE	04-Nov-15	PB	0.003	4500 N		FLINT	1670 DUPONT ST	FLINT	48504	
LF91287	MIKE	09-Nov-15	PB	0.003	4500 N		FLINT	218 W STEWART AVE	FLINT	48505	2310
LF92897	MIKE	18-Nov-15	PB	0.003	4500 N		FLINT	325 BEDE ST	FLINT	48507	2310
LF92707	MIKE	18-Nov-15	PB	0.003	4500 N		FLINT	3825 DAVISON RD #2	FLINT	48506	
LF92708	MIKE	18-Nov-15	PB	0.003	4500 N		FLINT	SANDRA L SMITH	FLINT	48503	2310
LF92717	MIKE	18-Nov-15	PB	0.003	4500 N		FLINT	3816 PARK FOREST DR	FLINT		2310
LF92723	MIKE	18-Nov-15	PB	0.003	4500 N		FLINT	509 WELLER ST	FLINT	48504	2310
LF90460	MIKE	04-Nov-15	PB	0.004	4500 N		FLINT	3510 ROBIN ST	FLINT	48505	2310
LF90463	MIKE	04-Nov-15	PB	0.004	4500 N		FLINT	1014 BARRINGTON DR	FLINT		
LF92704	MIKE	18-Nov-15	PB	0.004	4500 N		FLINT	2020 CROOKED LN	FLINT	48503	
LF92731	MIKE	18-Nov-15	PB	0.004	4500 N		FLINT	919 GLADWYN ST/MAIL TO	FLINT	48504	2310
LF91276	MIKE	09-Nov-15	PB	0.005	4500 N		FLINT	746 S SAGINAW ST	FLINT	48502	2310
LF92710	MIKE	18-Nov-15	PB	0.005	4500 N		FLINT	1262 GRACELAWN	FLINT	48505	2310
LF90462	MIKE	04-Nov-15	PB	0.006	4500 N		FLINT	2621 DELAWARE AVE	FLINT	48506	2310
LF92734	MIKE	18-Nov-15	PB	0.006	4500 N		FLINT	1320 BEARD ST	FLINT	48503	2310
LF90464	MIKE	04-Nov-15	PB	0.027	4500 N		FLINT	UNKNOWN	FLINT		
LF91279	MIKE	09-Nov-15	PB	0.033	4500 N		FLINT	227 E ALMA AVE	FLINT	48505	2310
LF92733	MIKE	18-Nov-15	PB	0.036	4500 N		FLINT	1134 SIMCOE AVE	FLINT	48507	2310
LF91272	MIKE	09-Nov-15	PB	0.050	4500 N		FLINT	1426 MAPLEWOOD AVE	FLINT	48506	2310

TOTAL SINCE 9/3/15 450 SAMPLES

90TH PERCENTILE = 10PPB

80% 5PPB OR LESS

92.7% 15PPB OR LESS

OVER 15 PPB

3x16 2x19
2x18 2x20
19 2x21

21 SAMPLES BETWEEN 26 & 327

11 SAMPLES >50 PPB

TOTAL SINCE 11/1/15 80 SAMPLES

90TH PERCENTILE = 4PPB

92.5% 5PPB OR LESS

95.0% 15 PPB OR LESS

OVER 15PPB

27, 33, 36, 50

TAKING ACTION ON FLINT WATER

- Flint deserves safe drinking water.
- The issues around Flint's drinking water represent the challenges of aging infrastructure.
- As Governor, I am committed to addressing the issue.
- Lead exposure is a serious issue.
- I appreciate those who have brought attention to this issue.
- We are committed to safe drinking water and to working in partnership with the city of Flint and the U.S. EPA.
- We must learn from what happened in Flint.
- **In October, I announced a ten point action plan to address lead exposure in Flint.**
- **Today, I am outlining additional actions to make sure the public health is protected in Flint and elsewhere in the State of Michigan.**
- **I am asking for changes in order to see that the Michigan Drinking Water Program becomes a national leader in public health protection.**

On October 2, 2015 the Flint Water Action Plan was announced. With the help of the Michigan Legislature and the Mott Foundation, we have taken significant action to address the issue. Actions include:

- **Switching back to the Great Lakes Water Authority/DWSD water supply (October 16, 2015)**
- Provided water filters to resident of Flint. (DHHS to provide update)
- Testing all Flint schools, preschools and day cares. Summary of results to date.(George to provide)
- Expanded health exposure testing of individual residences. Summary of results to date. (Nick to provide)
- Offer water testing at no cost to Flint residents to assure safe water. Summary of results to date. (George to provide)
- Expedite optimizing corrosion control in the Flint drinking water system. Summary of date completed. (George to summarize)
- Utilize the "Safe Drinking Water Technical Advisory Committee." To ensure the best technology, practices and science are being utilized; national experts have been assembled to provide technical advice.
- Accelerate water system improvement to address replacement of lead service lines. We are working with the city of Flint and our Congressional delegation on a lead service line replacement plan.
- Working to expedite the completion of the Karegnondi Water Authority.
- Expand a lead education program. (DHHS to provide update)
- Dr. Eden Wells was named as the Flint Drinking Water Public Health Advisor to ensure safe drinking water.

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

Flint Drinking Water Events Timeline

- April 2013 – Flint notifies DWSD of contract discontinuation and joins the Karegnondi Water Authority
- April 2013 – DWSD sets termination of Flint water service contract to April 17, 2014 NOTIFICATION
- June 2013 – Karegnondi Water Authority groundbreaking
- June 2013 – Flint notifies DEQ of intent to use of Flint Water Treatment Plant full time with Flint River WHAT WAS DEQ'S RESPONSIBILITY TO HELP MAKE THIS HAPPEN
- May 2014 – Flint stops purchasing DWSD water. Starts using the City of Flint WTP and Flint River
- August 2014 – Flint E.Coli Bacteria violation, Partial System Boil Water Advisory
- August 2014 – Disinfection Byproducts, DEQ requests preemptive Operational Evaluation
- September 2014 – Flint Total Coliform Bacteria violation, Partial System Boil Water Advisory
- November 2014 – Disinfection Byproducts violation begins OCTOBER 2014 GM SWITCHES WATER SOURCES
- January 2015 – 1st 6 month lead and copper sampling completed 100 samples, 90th% = 6 ppb
- July 2015 – 2nd 6 month lead and copper sampling completed 69 samples, 90th% = 11 ppb NEED DESCRIPTION OF 2 CONSECUTIVE 6 MONTH PERIODS
- August 2015 – Disinfection Byproducts return to compliance
- August 2015 – Flint required by DEQ to recommend and install Optimized Corrosion Control Treatment
- September 24, 2015 – Hurley Children's Hospital data reveals high lead levels in Flint children
- October 8, 2015 – State screening results show elevated lead levels in Flint schools
- October 2015 (anticipated) – Flint switches back to DWSD for water
- July 2016 – Planned connection to Karegnondi Water Authority (Lake Huron water to Flint WTP)

School	Service Line Information	Date of Survey	Report Format	Status
Administration Building	a four-inch diameter cast iron or ductile iron water service line entering into the boiler room.	11-Dec-15	Short	Sent for Final Review/Online 2/9/16
Brownell Academy	A four-inch diameter cast iron water service line enters the main school building in the mechanical room located in the middle of the building	31-Oct-15	Old	Online
Central Kitchen		1-Nov-15		OEA needs notes for water main information
Doyle-Ryder Elementary	A four-inch diameter cast iron water service line enters the school in the first floor mechanical room by the northeast wall, in the newer building on the northeast side of the school. Piping in the mechanical room transitions into copper piping with lead solder joints for cold water lines. Two separate copper cold water supply lines exit the mechanical room.	7-Nov-15	Old	Online
Durant-Tuuri-Mott Elementary	A six-inch diameter cast iron water service line enters the school in a tunnel under the swimming pool area along the south corner of the pool area. Cold water piping in the school transitions into a six-inch galvanized line that runs from the pool and splits into three branches.	14-Nov-15	Short	Sent for Final Review/Online 2/9/16
Eagles Nest Academy	An inspection of the water main from inside the building yielded a three-inch ductile iron water main, soldered to a three-inch copper water main.	16-Jan-16	Short	Sent for Final Review/Online 2/9/16

Eisenhower Elementary	A four-inch diameter cast iron water service line enters the main school building in the boiler room northwest wall located in the west corner of the building. Piping in the boiler room immediately transitions into galvanized metal piping for cold water lines.	31-Oct-15	Old	Online
Freeman Elementary	A four-inch diameter cast iron water service line enters the school in the boiler room on the west wall. Piping in the boiler room immediately transitions into galvanized metal piping for cold water lines.	31-Oct-15	Old	Online
Holmes Stem Academy	A *six-inch diameter cast iron water service line* enters the boiler room. The boiler room is located on the south side of the building. A three-inch galvanized water supply line runs from the meter.	12-Dec-15	Old	Online
Manley School	An inspection of the water main from inside the building yielded a three-inch ductile iron pipe, welded to a copper water main.	16-Jan-16	Short	Sent for Final Review/Online 2/9/16
Michigan School for the Deaf	An inspection of the water main from inside the building yielded a four-inch ductile iron pipe, welded to a three inch copper main.	23-Jan-16	Short	Sent for Final Review/Online 2/9/16
Pierce Elementary	A four-inch diameter cast iron or ductile iron water service line enters the boiler room	7-Nov-16	Old	Online
Potter Elementary	A four-inch diameter cast iron water service line enters the main school building in the northwest corner of the boiler room.	5-Dec-16	Old	Online

Krisztian, George (DEQ)

From: Katarsky, Anthony (MSP)
Sent: Tuesday, January 05, 2016 4:36 PM
To: Linda.Dintenfass2@redcross.org; Manning, Peter (AG); Bishop, Mark (MDCR); Betterly, Steve (DHHS); Deacon, Brad (MDARD); Travelbee, Brent (MDOC); Burgess, Louis (MDE); Hagler, Gary (DNR); Lixey-Terrill, Jennifer (DHHS); Thelen, Richard (DHHS); Towne, Karen (LARA); Deprez, Michael (LARA); Badgero, William (MDOS); Doll, Jeanette (DTMB); Phifer, Eileen (MDOT); Luepnitz, Ann (Treasury); Smith, Paul (GOV); Kirby, Catherine (DIFS); Alisha Clack; Vargovich, Carol (MCSC); Kelly, David (MSP); Ort, John; chad.d.randall.mil@mail.mil; Maczko, James; McDonough, John; Feldpausch, Lynne (MEDC)
Cc: Simon, Terri (DHHS); Merrill, Debra (MDARD); paul.spata@redcross.org; Howd, Raymond (AG); Levy, Daniel (MDCR); Lardie, Keri (MCSC); Farmer, Michael V. (MDOC - Training); Guerrant, Kyle (MDE); Wolf, Jennifer (DNR); Weber, Travis (GOV); Wahl, Kathy (DHHS); Wilson, Brian (DHHS); Morante, Teri (DIFS); Gensler, Alesha (LARA); Wieber, Kevin (LARA); dkelley@michmab.comm; acdonelld@courts.mi.gov; billy.g.beliew.mil@mail.mil; richard.pollman@noaa.gov; Wolf, Jennifer (DNR); klipad@charter.net; Lienhart, Kevin (MDOS); Bolger, Matt (MSP); Teri Martin (MEDC); McKee, Ryan (DTMB); Vallier, Connie (MDOT); Poynter, Jacob (Treasury); Kelenske, Chris (MSP); Strobel, Pamela (MSP); Krisztian, George (DEQ); Burger, Penelope (MSP); Covey, Gabriel (MSP); Galbreath, Wendy (MSP); Hampton, Jacqueline (MSP); Leix, Ron (MSP); Porcello, James (MSP); Reese, Jaqueline (MSP)
Subject: URGENT - SEOC Activation

On January 4, 2016, Genesee County requested that a "State of Emergency/Disaster" be issued by Governor Snyder. Today, the Governor issued a State of Emergency declaration.

EMHSD will activate the SEOC tomorrow at 0800 and will conduct a briefing at 0900 on the event. All state agencies are to send a representative to the 0900 briefing. MDHHS and MDEQ have been directed to brief on the situation. Following initial SEOC briefings, each state agency, in consultation with the State Director, must determine if they need to play a role in ongoing SEOC operations to contribute to addressing the problem. At minimum, MDEQ, MDHHS, Education, DTED, DTMB, and MDARD should maintain a presence in the SEOC. The initial focus of the SEOC will be to:

- Identify and implement any needed protective actions to protect public health and safety;
- Develop situational awareness;
- Develop understanding of technical aspects;
- Coordinate damage assessment;
- Coordinate public information; and
- Identify programs to assist in remediating damage.

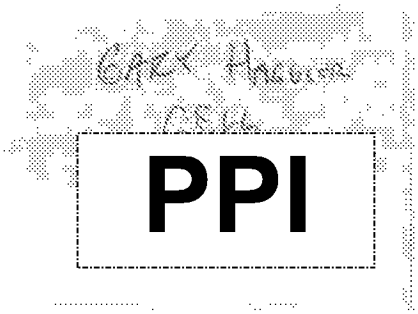
If you require anything in the interim, please contact me by email or cell (517-242-5371).

Anthony P. Katarsky
Assistant Division Commander
Michigan State Police
Emergency Management and Homeland Security Division
517-336-2686

4000 Collins Rd

East

Jolly Rd Exit



needs to be developed that takes all factors into consideration so that this can be done expeditiously and systematically.

What are some of the key things that are needed?

Funding for lead service line replacement

Funding for the continued use of the DWSD until the KWA is fully online

Funding for the creation of a lead testing and response program for all schools in the state of Michigan

Funding for the creation of educational programs that can assist parents on how to deal with lead exposure through nutrition and other measures

Increase support for nutritional assistance for young children

Funding for the creation of a program to assist with the educational needs of children suffering from lead exposure

Close integration of all public infrastructure projects, e.g. roads, water and sewer

Increase capacity to be able to verify compliance data submitted by water supplies

City of Flint Water
Action Steps for Week of October 26-30

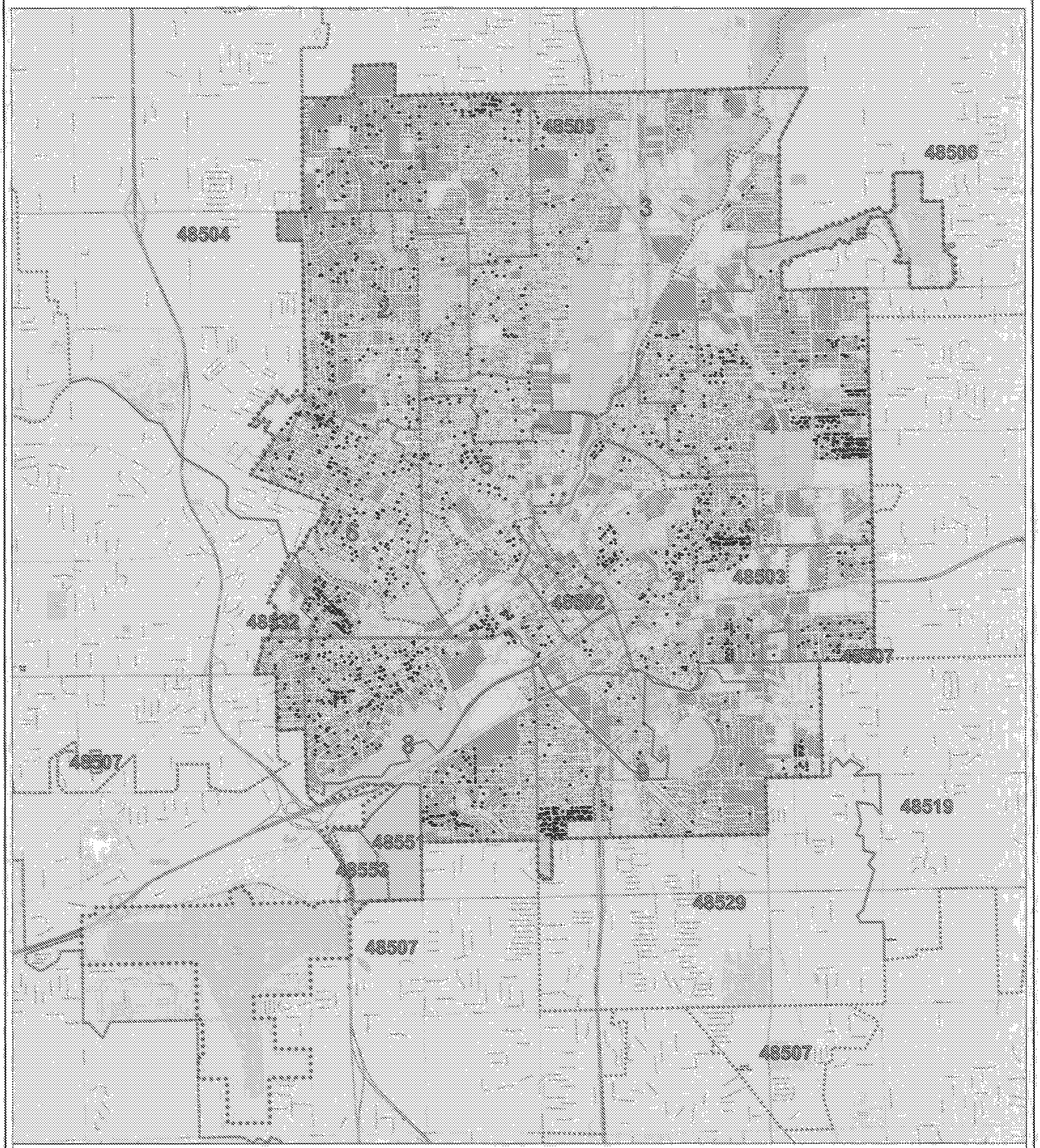
Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Conduct After Action Plan	DEQ	George Krisztian	Meeting held on 10/29/15 to discuss time line
2.	Introduce legislative changes to Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone George Krisztian Sonya Butler	Draft language submitted to Maggie Pallone for review
3.	After Action Review Panel	DEQ	Madhu Anderson George Krisztian Karen Tommasulo	Panel created and press release issued on 10/21/15
4.	Staff hiring plan	DEQ	Jim Sygo Maggie Pallone George Krisztian	Negotiations underway to contract with the Genesee County Health Department
5.	Finalize fiscal year 2017 budget request	DEQ	Maggie Pallone George Krisztian	
6.	Meeting(s) with school staff/management	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	A summary report for Freeman Elementary School has been drafted
7.	Meet with DHHS and discuss all lead education material for schools	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	Meeting held on 10/27/15; action items created
8.	Review corrosion control treatment plan and get any EPA comments	DEQ and EPA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Meeting held on 10/28/15 to discuss comments. Comments incorporated & report issued

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
9.	Review construction permit application and issue construction permit for phosphate equipment	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	Act 399 permit issued 10/28/15
10.	Review Standby Operation of Flint Water Treatment Plant with city of Flint	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Comments by DEQ to city of Flint have been provided
11.	Work with Karegnondi Water Authority (KWA) and other agencies to address bottleneck issues; check weekly for status update	DEQ and KWA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Issues regarding soil erosion controls during construction are being addressed
12.	Contact city of Flint for Service Line Record status update and obtain a copy of the records to date	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Cross-referencing process has begun
13.	Provide DHHS with any available cross-reference information	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
14.	Develop childcare facility guidance or review DHHS-related materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	Meeting held on 10/27/15; DHHS to provide materials
15.	Create a generic school sampling guidance document for statewide distribution; target audience: schools served by municipal water	DEQ and DLARA	Jim Sygo Steve Busch Richard Benzie	Final draft of school sampling protocol has been written and is awaiting final review

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
16.	Confirm plumbing assessment and sampling is scheduled for Brownell K-2 STEM Academy and Eisenhower Elementary School	DEQ and DLARA	Jim Sygo Steve Busch Mike Prysby	Sampling materials have been requested from DEQ Laboratory

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

1,951 Potential Water Test Sites (2/01/2016 at 1100)



State of Michigan

Date: 01/30/2016

Legend - Map 1

- Potential Water Test Sites
- Flint Area Zip Codes
- Franchise Parcels
- Flint City Wards
- Flint City Boundary

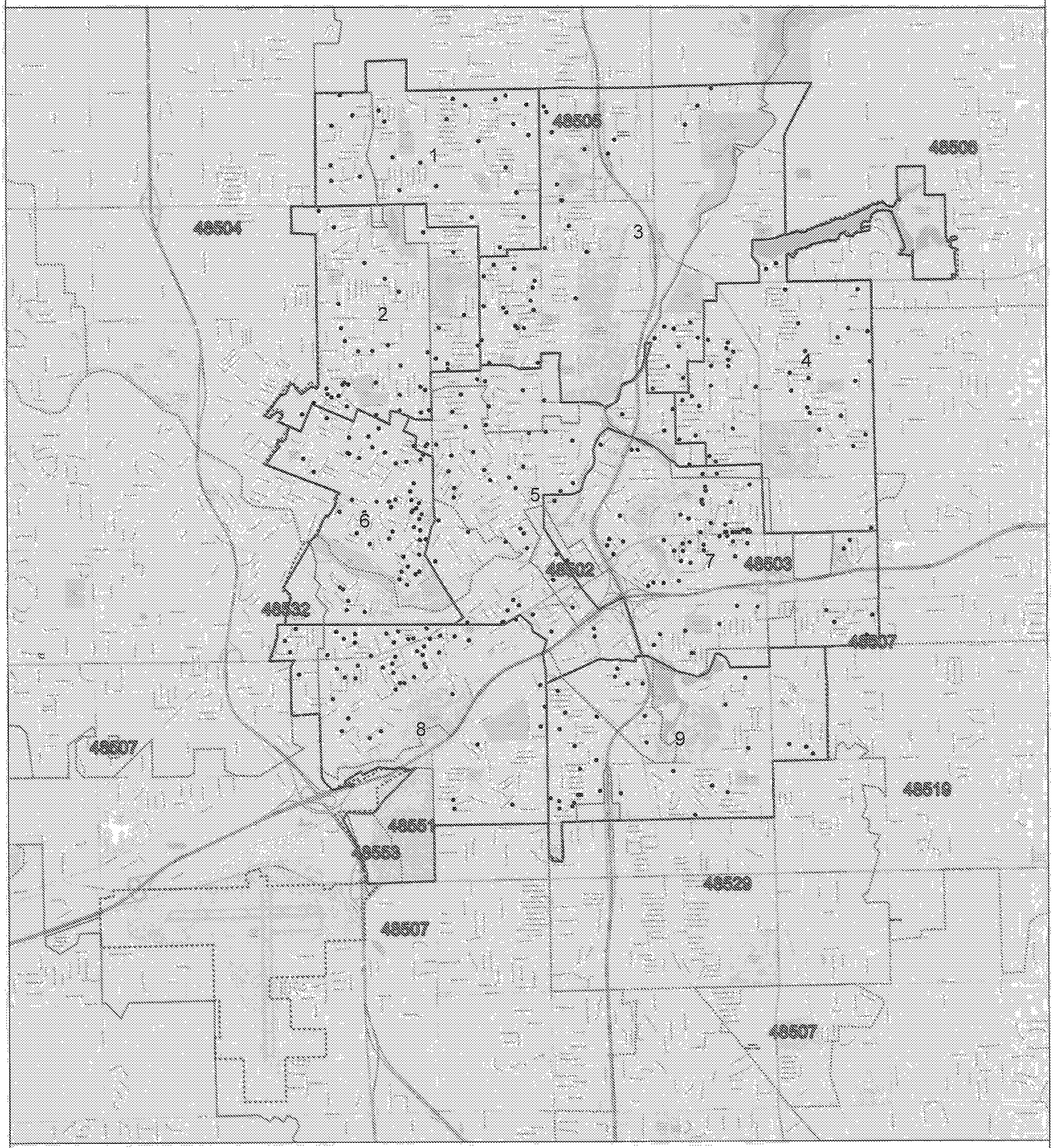
Service Line (Material)

- Lead
- Other
- Unknown

N

1 0.5 0 1 Miles

402 Potential Sentinel Water Test Sites (2/01/2016 at 1100)



Legend - Map 2

- Potential Sentinel Water Test Sites
- Flint City Boundary
- Flint Area Zip Codes
- Flint City Wards

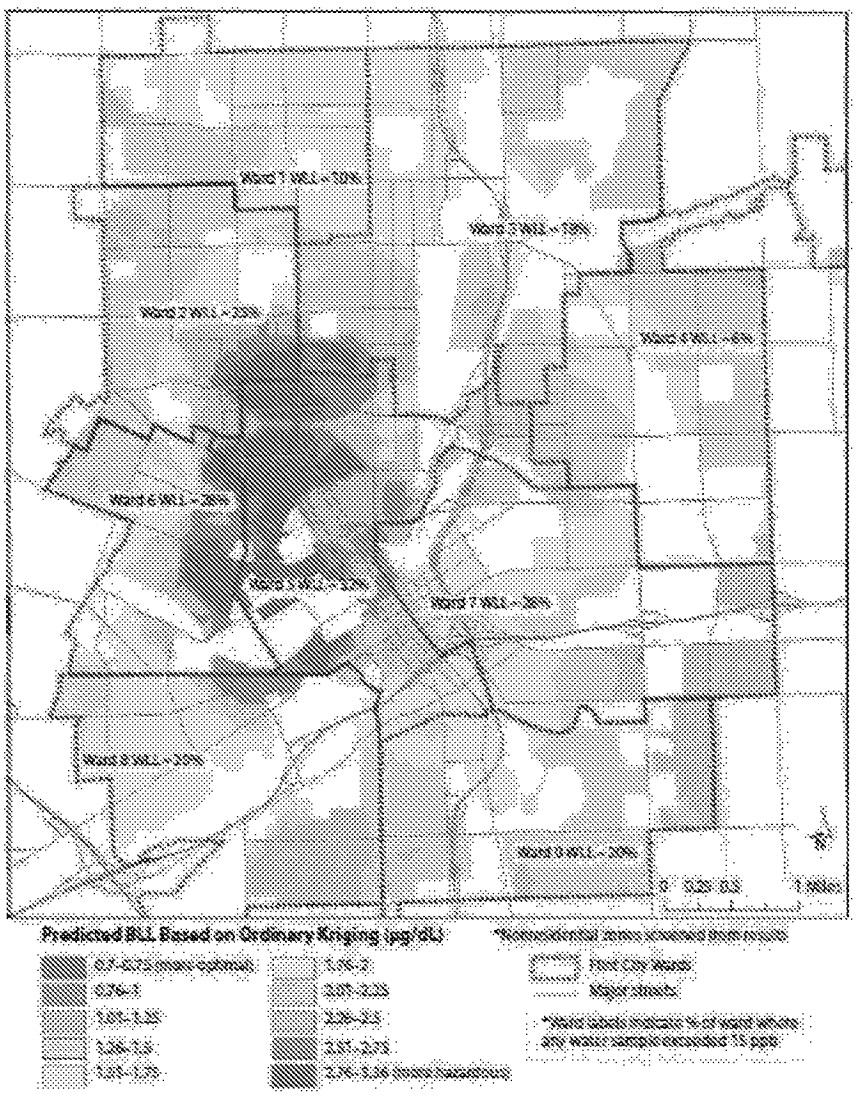
State of Michigan

Date: 02/01/2016

N

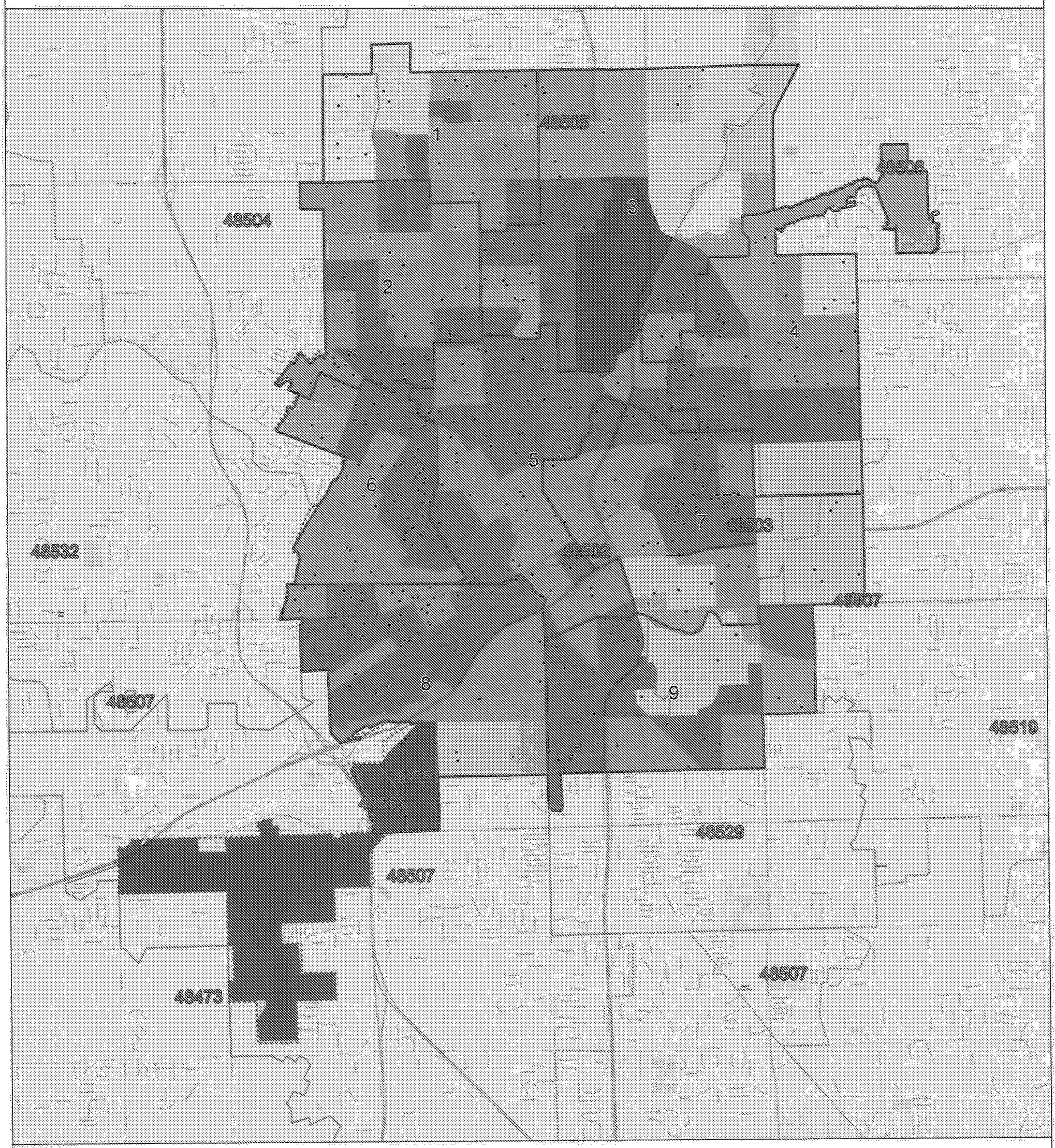
0 0.5 1 Miles

BLOOD LEAD PREDICTIVE MODEL

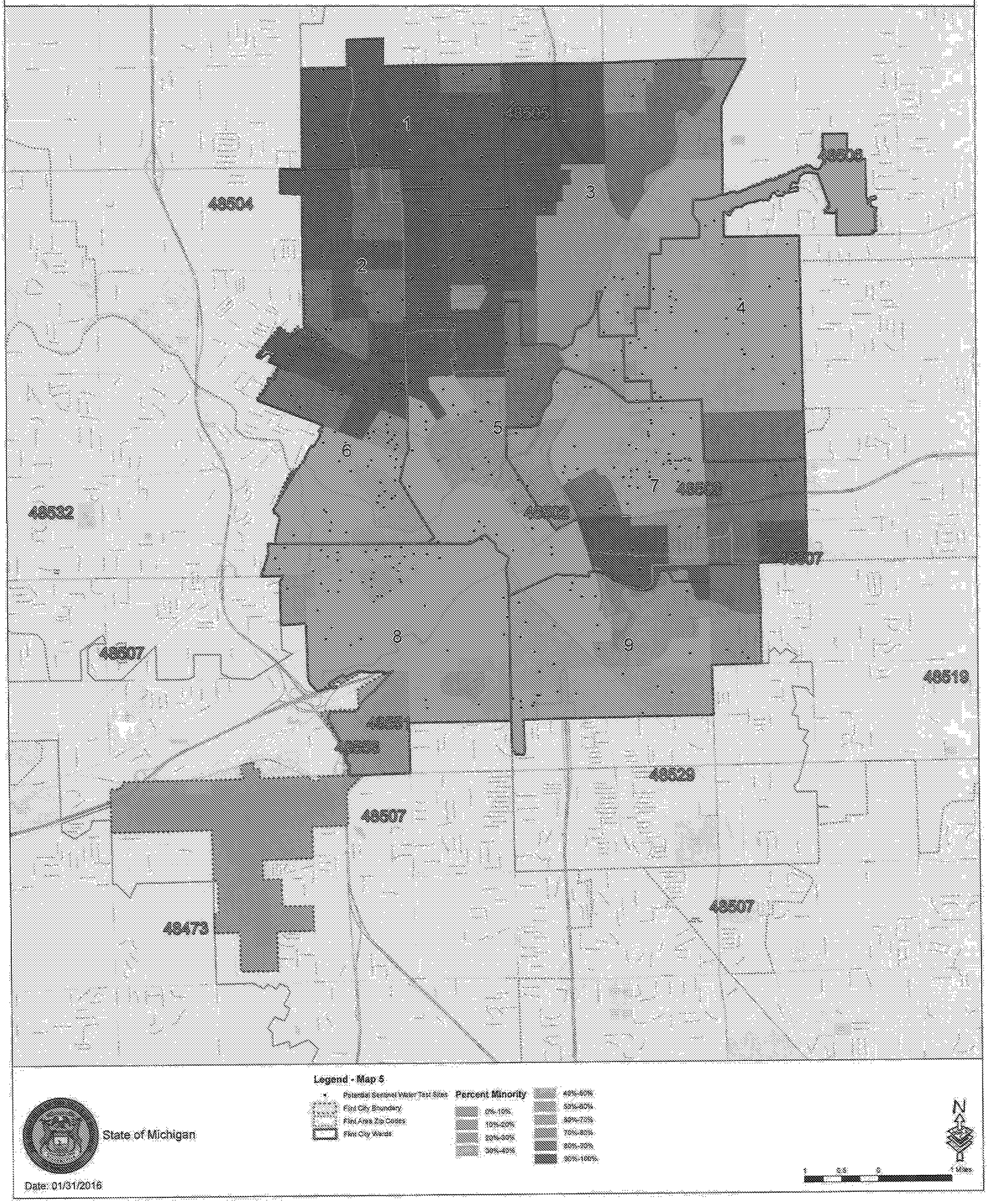


Keys: BLL = blood lead level; WLL = water lead level

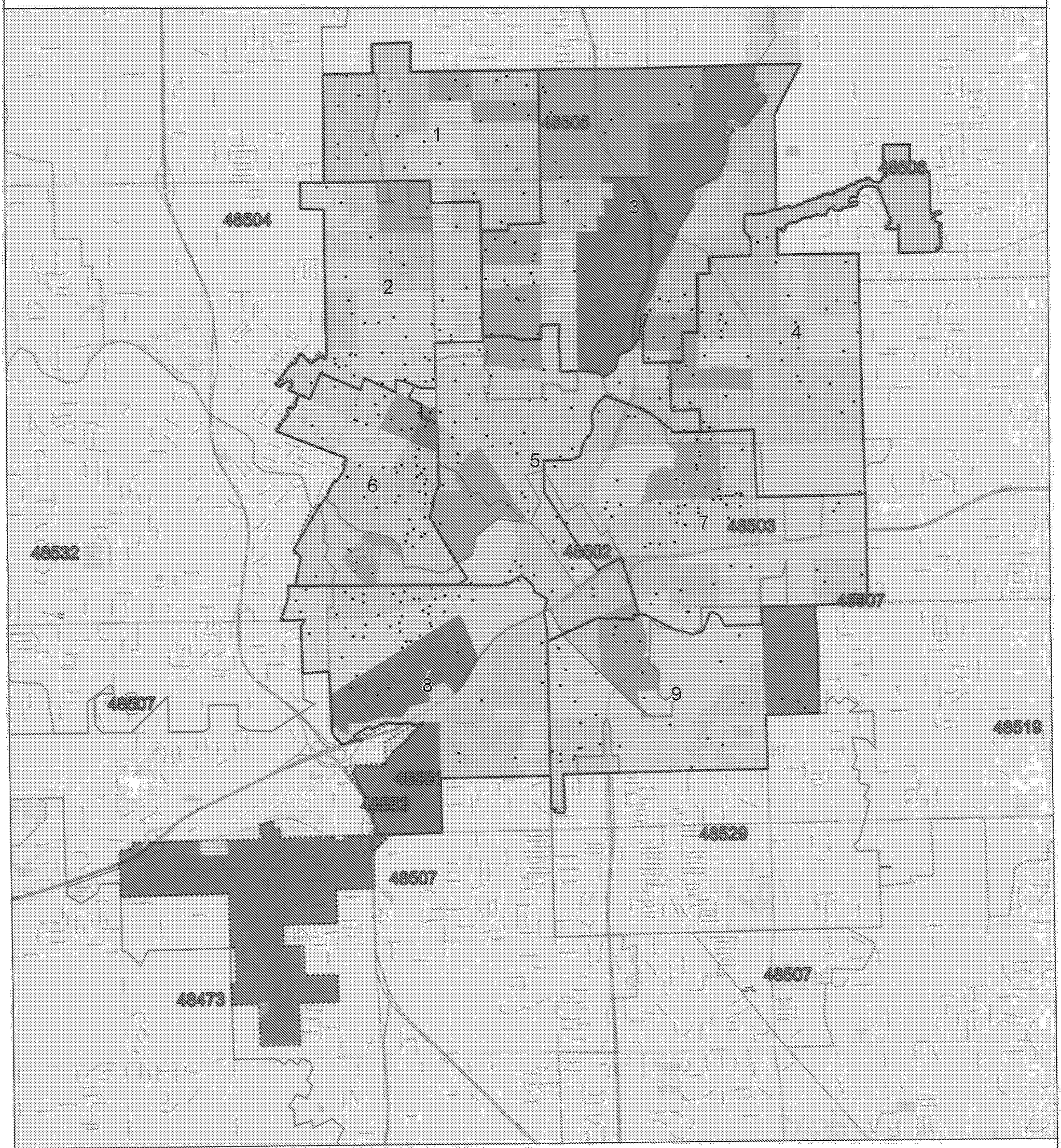
402 Potential Sentinel Water Test Sites (2/01/2016 at 1100)



402 Potential Sentinel Water Test Sites (2/01/2016 at 1100)



402 Potential Sentinel Water Test Sites (2/01/2016 at 1100)



Legend - Map 6

Potential Sentinel Water Test Sites
Flint City Boundary
Flint Area Zip Codes
Flint City Wards

Percent Low Income

0%-10%
10%-20%
20%-30%
30%-40%
40%-50%
50%-60%
60%-70%
70%-80%
80%-90%
90%-100%

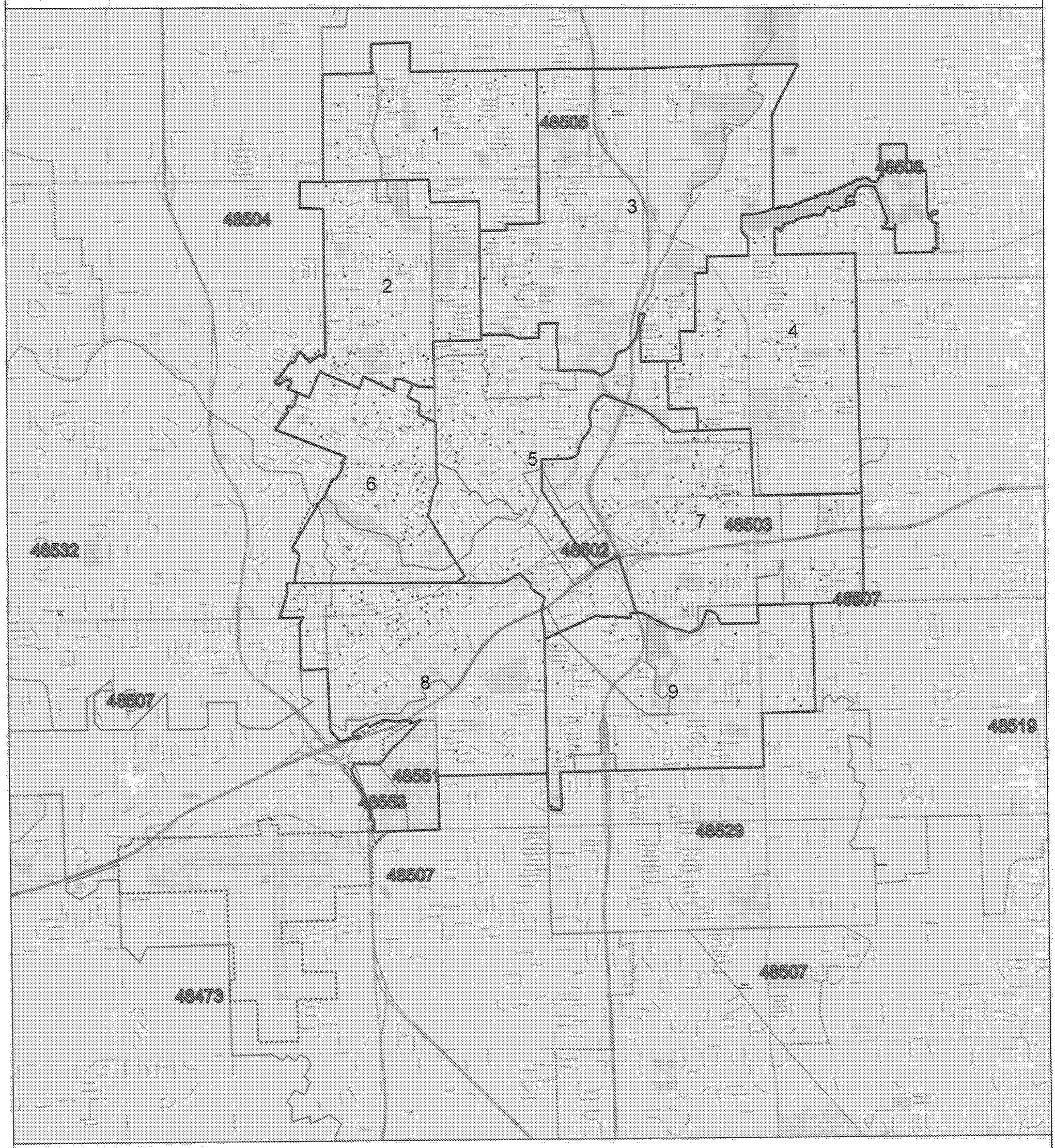
State of Michigan

Date: 01/31/2016

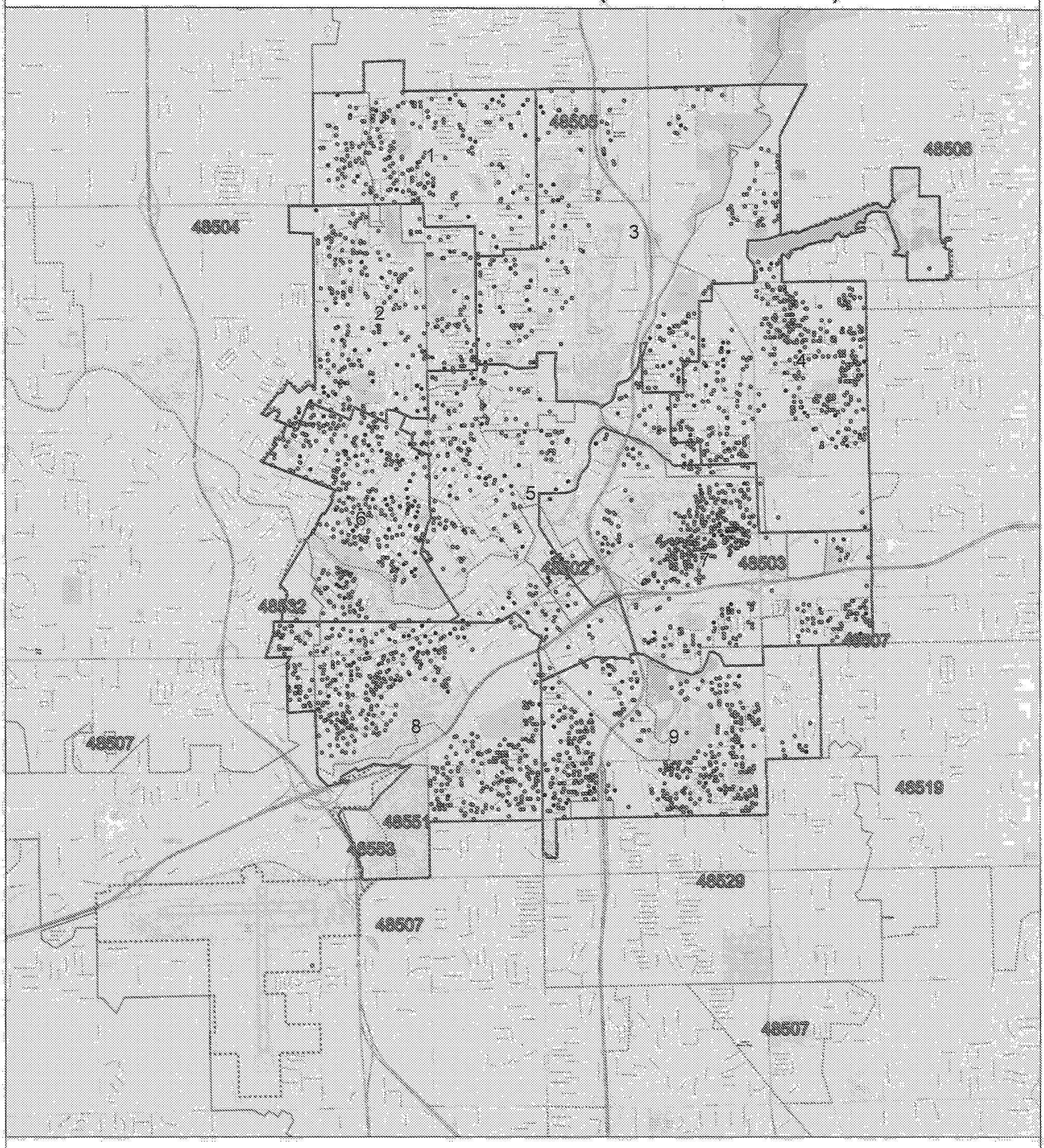
N

0 0.5 0 1 Miles

402 Potential Sentinel Water Test Sites (2/01/2016 at 1100)



2613 Water Sample Results on (1/31/2016) & Potential Sentinel WaterTest Sites (2/01/2016 at 1100)



State of Michigan

Date: 01/31/2016

Legend - Map 8

- Below Actionable Level
- Above Actionable Level
- Potential Sentinel Water Test Sites
- Flint City Boundary
- Flint Area Zip Codes
- Flint City Wards

N

0 0.5 1 Miles

Flint School and Residential Water Testing Data
Nov. 9, 2015

Situation overview:
As part of the Governor's action plan for Flint drinking water, the DEQ recently provided free water testing to any interested resident, as well as developed a comprehensive school testing protocol for all Flint Community Schools as well as any private or charter school in the city.

Testing data from both Freeman Elementary and residences indicate the same thing: Problems with lead seem to be localized to specific homes or specific taps, and are not found system-wide.

Talking points:

- Lead can enter drinking water by leaching out of outdated plumbing infrastructure.
- The DEQ and DLARA tested 31 faucets and fountains in Freeman Elementary School to understand the impact of fixture plumbing. Nine of these faucets came back with elevated lead levels greater than 15 parts per billion, while 22 did not. This suggests problems with lead are found in the fixture plumbing.
    - The school has three choices for remedying the problem at these nine faucets:
        - Don't use those faucets or fountains.
        - Implement a flushing protocol. Testing indicates that flushing water through those faucets for 3 to 4 minutes every morning would greatly reduce lead exposure.
        - Replace those faucets and fountains with lead-free materials.
    - Additionally, the DEQ and DLARA conducted 10 tests at three outlets in the school building to check for any problems deeper in the plumbing. Results of these tests were consistent with the initial tests of 31 faucets and fountains, confirming the problem lies with individual fixtures.
- As of DATE, the DEQ has processed # of residential water tests. Of these, more than 75 percent demonstrated results of 5 parts per billion or less. More than # percent demonstrated results of 15 parts per billion or less.
    - This again suggests lead problems are not found system-wide, but are instead found in some homes' service lines.
    - Anyone concerned about their home's lead levels is encouraged to use a water filter and to get their water tested. Tests are free and available by calling the Flint Water Plant at 810-787-6537 and pressing 1, or by emailing flintwater@cityofflint.com.

Audiences:

City of Flint Drinking Water
Outline prepared by the
Michigan Department of Environmental Quality for the
Flint Water Task Force

I. INTRODUCTION

This document is intended to provide an overview of Michigan's implementation of the Safe Drinking Water Act, 1976 PA 399, as amended (Act 399), with respect to events in the city of Flint (City), Michigan.

II. BACKGROUND

1. How has Flint historically obtained its drinking water?

The water system in the City was organized and built under private ownership in 1883 as the Flint Water Works Company to pump raw water from the Flint River to their consumers. In 1903, the system was converted to a municipally-owned corporation which supplied drinking water to the City. In 1967, the City became a customer of the Detroit Water and Sewerage Department (DWSD) system.

After the switch to DWSD, the City operated its water treatment plant (WTP) as a standby plant for purposes of reliability in the event of an emergency, such as an interruption in service of the single pipeline from DWSD. In the last ten years, the WTP was used as an emergency backup during two weeks in 2009: June 18 through June 20 and September 10 through September 13.

As a backup emergency WTP, the City was required to operate the WTP quarterly to demonstrate the capability to produce safe water in accordance with Act 399 and to keep mechanical equipment (such as valves, rubber seals, etc.) in good working order. Each quarter, the WTP was test run and samples were taken of both raw water and finished water (post-filters). Since the WTP was upgraded in the early 2000's, monitoring showed that the WTP was performing as designed.

Contractual obligations with DWSD did not allow treated water to be put into the City's distribution system during these test runs. Treated water was discharged to the river in accordance with a National Pollutant Discharge Elimination System (NPDES) Permit. The test runs were for demonstration purposes, to keep the WTP operational, and staff familiar with operation in the event it was needed in an emergency.

2. What State and Federal laws or rules exist to ensure safe drinking water is provided to City residents?

The federal Safe Drinking Water Act (federal SDWA) is the primary law that ensures the quality of Americans' drinking water. Under the federal SDWA, the United States Environmental Protection Agency (USEPA) sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.

The federal SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. (The federal SDWA does not regulate private wells which serve fewer than 25 individuals.)

Originally, the federal SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap. The most direct oversight of water systems is conducted by state drinking water programs. States can apply to the USEPA for "primacy," - the authority to implement the federal SDWA within their jurisdictions - if they will adopt standards at least as stringent as the USEPA's and enforce those standards. Michigan adopted the Safe Drinking Water Act in 1976 through Act 399 and has maintained primacy for the program since that time.

3. **What is the USEPA's role as a regulatory agency in implementing the SDWA?**

Federal and state governments share responsibility for administering drinking water programs. Under the federal SDWA, the USEPA is given the responsibility for developing national standards and regulations that apply to the nation's public drinking water systems and enforcing those standards, by working with states.

Michigan's drinking water program is evaluated annually by the USEPA for compliance with the federal SDWA. Based upon these evaluations, the USEPA continues to find Michigan's drinking water program to be compliant with the federal SDWA.

4. **What is the Michigan Department of Environmental Quality's (DEQ) role as a regulatory agency in implementing the SDWA?**

The federal SDWA permits states to accept oversight of the drinking water program under an agreement with the USEPA giving states primary enforcement responsibilities (or primacy). In addition to this delegation of federal authority to the states, states also have the power to create additional regulations and programs governing drinking water suppliers through their own legislative and regulatory processes. Michigan has had regulatory authority of public water supplies since 1913 (Waterworks and Sewerage Systems, 1913 PA 98).

The DEQ has been granted primary enforcement authority in Michigan for the federal SDWA under the statutory authority of Act 399. As such, the DEQ, Office of Drinking Water and Municipal Assistance, has regulatory oversight for all public water supplies, including approximately 1,400 community water supplies and 10,000 noncommunity water supplies. A community water supply provides year-round service to 15 or more living units (homes, apartments, dorm rooms, etc.) or 25 or more residents. A noncommunity water supply has 15 or more service connections or serves 25 or more individuals on an average daily basis for not less than 60 days per year.

The DEQ engages in a variety of activities to help water systems remain in, or return to, compliance. These activities include: conducting surveillance visits (inspections) at water systems and reviewing facilities, equipment, and operations; requiring the submission of plans and specifications for waterworks system improvements and issuing construction permits; providing for the training, examination, certification and regulation of persons operating water supplies; helping systems incorporate preventive measures; and since 1996, providing financial assistance for system improvements.

5. What is the City's role in implementing the federal SDWA and Act 399?

State and federal programs develop regulations and perform oversight and compliance activities, but do not treat or deliver water to customers. At the local level, public and private water utilities collect, treat, and deliver drinking water to consumers in compliance with state and federal regulations.

To ensure that drinking water is safe, the federal SDWA sets up multiple barriers against contamination. These barriers include: source water protection, multiple treatment components, distribution system integrity, proper operations oversight, and public information. As the owner of a public water system, the City is responsible for knowing and following all requirements under Act 399, such as ensuring proper design, construction, operations and maintenance, so that contaminants in tap water do not exceed the standards established by law. The City treats the water, and must test its water frequently for specified contaminants and report the results to the DEQ. If a water system is not meeting these standards, it is the water supplier's responsibility to notify its customers.

The federal SDWA recognizes that customers have the right to know what is in their drinking water and where it comes from. The City, like all water suppliers, must notify consumers when there is a problem with water quality.

The City submits samples of its water for laboratory testing (monitoring) to verify the water they provide to residents meets all federal and state standards. How often and where samples are taken varies from system to system and from contaminant to contaminant. The DEQ provides an annual monitoring schedule to the City setting forth these requirements.

In addition, the City is required to employ properly certified water operators that are trained and experienced to operate the treatment and distribution systems associated with the City's water system.

6. What approvals were needed from the DEQ in order for the City to begin using its water treatment plant full time?

The City had long ago been issued construction permits for raw water pumps to withdraw water from the Flint River and the City was grandfathered under the Water Withdrawal program (Part 327, Great Lakes Preservation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended) as were all existing community public water systems at that time. There were no additional DEQ permissions or authorizations required.

Under Act 399, there are no licenses or permits required to operate public water systems. The City did apply for and obtained two construction permits prior to the WTP changing from an emergency back-up plant to full-time operation. These permits were for changes such as new chemical feed equipment, changes to the electrical service, etc.

III. THE FLINT RIVER – IS IT A SAFE SOURCE OF DRINKING WATER?

Seventy-five percent of Michigan's population on a public water supply receives its drinking water from surface water sources, the majority of which is withdrawn from the Great Lakes. However, several public water supplies in Michigan utilize water from inland rivers. All surface water sources require significant treatment in order to be safe for consumption.

While all surface water sources must receive this higher level of treatment, inland river sources present a greater challenge than water withdrawn from one of the Great Lakes because of rapidly changing water quality conditions. Under most circumstances, rivers are also prone to greater fluctuations in temperature, have higher amounts of organic material, greater turbidity (suspended solids), and are more vulnerable to microbiological and viral contamination than Lakes Huron, Erie, Michigan or Superior. It should be noted, that while the water chemistry in the Flint River differs from that in Lake Huron, it can still be treated in accordance with the federal SDWA and Act 399. The waterworks industry has the technology to treat wide ranging source waters to provide potable and palatable drinking water, including direct reuse of treated wastewater. Regardless of source water quality, all public water systems must comply with the same drinking water standards in the finished water.

2. Also, it is not the source water that reacts with the homeowners plumbing out in the distribution system, but rather the finished water quality that is important. Treated water leaving the City's WTP does not contain lead. In addition, the treatment process employed by the City includes lime softening to reduce the hardness in the river water. The City includes lime softening and pH adjustment primarily to improve aesthetic water quality associated with hardness. Lime softening is not a process that water supply professionals would expect to increase corrosivity of water. The City, however, does practice recarbonation to readjust pH at the end of the softening process.

pH levels of finished water leaving the City's WTP averaged 7.7. Expanded water monitoring conducted quarterly at 25 sample sites located throughout the distribution system showed the following:

July – September 2014	average pH = 7.71	range: 7.56 – 7.86
October – December 2014	average pH = 7.88	range: 7.62 – 8.10
January – March 2015	average pH = 7.81	range: 7.60 – 7.99
April – June 2015	average pH = 7.63	range: 7.48 – 7.80

The following data was obtained at ten of the sampling locations throughout the City's distribution system, but while they were still purchasing water from DWSD before the City switched to the Flint River as a source:

January – March 2014 (DWSD)	average pH = 7.47	range: 7.40 – 7.54

April 2014 (DWSD) average pH = 7.49 range: 7.42 – 7.59

Note that the pH of the treated water produced while the City was using the Flint River did not differ significantly from pH values seen in the distribution system during the time the City purchased water from DWSD. Thus, pH monitoring provided no indication of a change in water corrosivity.

IV. *E. COLI* AND TOTAL COLIFORM BACTERIA VIOLATIONS

1. What caused the *E.Coli* and total coliform bacteria violations experienced by the City in August and September 2014?

A number of factors, not one specific cause, likely contributed to the Boil Water Advisories in the City during August and September 2014 triggered by exceedances of bacteria standards in limited areas of the distribution system. In addition, the coliform detections were confined to less than 20 percent of the water system. Had the detections been the result of a failure in treatment, detections would have been expected throughout the City rather than in such a limited geographic area.

Instead, the violations seem to have been caused by other factors such as aging infrastructure. The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of unlined cast iron piping. This cast iron pipe is subject to tuberculation, which thins and weakens the pipe walls in some areas and causes a buildup of sediment and debris on the pipe walls in other areas. Tuberculation can lead to water quality issues as well as reduced flows and pressures. Tuberculation also encourages the development of biofilms. Biofilm growth may occur more frequently in areas where little or no disinfectant residual is maintained.

The City has also experienced decades of a declining customer base and water use, with vacant homes, commercial businesses and industrial property. Declining water use leads to excess residence time (water age) within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and reductions of disinfectant concentration in the distribution system. While the City has recently seen an infusion of funding for blight removal, contractors using fire hydrants to complete this work have been known to cause hydraulic disturbances that dislodge and suspend settled debris, which may contribute to the bacterial contamination. These hydraulic disturbances were also believed to be a source of the aesthetic water quality complaints both the City and the DEQ were receiving.

The winter of 2013/2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30 percent, saw even greater losses since February 2014 due to an increase in cold weather related water main breaks and leaks (City personnel reported 400 water main breaks in calendar year 2014, with greater than 50 percent in the winter quarter). The City has also been lacking a formal maintenance program for its more than 7,250 valves, which are critical in limiting the areas impacted during water main repairs. As an example, two valves on the transmission line used to supply the area of the 2014 Boil Water Advisories were found to be closed during

the City's investigation of possible sources, causing much longer residence times, reduced disinfectant residuals, and reduced pressures – all potential avenues for contamination to enter a distribution system.

The Boil Water Advisories also occurred during the warmest and relatively wet periods of August and September 2014. Warm weather conditions are not only more conducive to bacterial growth but also degrade disinfectant residuals more quickly. As already explained, longer residence times, biofilms, and tuberculation contribute to lowered disinfectant concentrations. Warm, wet weather conditions also allow water contaminated with bacteria to accumulate or pond around piping that leaks and breaks.

During the summer of 2014, the city was actively repairing the distribution system (City personnel reported 29 water main breaks in June through August 2014). After the switch to the Flint River, it was discovered that there were many broken or closed valves in the distribution system (City personnel reported 120 broken valves and 239 valves in an improper position). As the City began correcting this problem they did detect the presence of coliform organisms in the distribution system in the testing conducted as a result of the repairs. This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

2. How were the violations detected? What was the DEQ's response?

Federal SDWA regulations regarding monitoring and standards for bacteria in water distribution systems are incorporated into Act 399. There are a variety of bacteria, parasites, and viruses which can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, community water systems are required to test monthly for total coliform and *E.coli*. Total coliform bacteria, while not pathogenic, often originate from the same sources as many pathogens. Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system indicates a minimal likelihood that pathogens are present. *E.Coli* is itself a pathogen and its detection is considered direct evidence of a health risk.

The Boil Water Advisories which occurred in the City were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the City after consultation with the DEQ.

Upon receiving information indicating total coliform and *E. Coli* bacteria had been detected, DEQ advised the City to issue a Boil Water Advisory from August 15 through 20, 2014, for the affected portion of the City. Another Boil Water Advisory was issued from September 5 through 9, 2014, due to localized detections of total coliform bacteria in the same and adjacent portions of the City. The advisory covered an area approximately 6 square miles or less than 20 percent of the water department's service area of just over 34 square miles.

Once a Boil Water Advisory has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may

take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Under approved analytical methods used by the City, samples must be incubated for 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a Boil Water Advisory. Adding each of these steps together, a normal response period to rescind a Boil Water Advisory under these circumstances would be expected to take 3 to 4 days.

V. TOTAL TRIHALOMETHANES (TTHM) VIOLATIONS

1. What caused the TTHM violations experienced by the City beginning in late summer 2014?

Disinfectants are an essential element of drinking water treatment because of the barrier they provide against waterborne disease-causing microorganisms. However, disinfection byproducts form when disinfectants used to treat drinking water react with naturally occurring organic materials in the water (e.g., decomposing plant material). The formation of disinfection byproducts continues to occur as water travels throughout water distribution systems.

A major challenge for water suppliers is how to provide protection from pathogens while simultaneously minimizing health risks to the population from disinfection byproducts. Total Trihalomethanes (TTHM – chloroform, bromoform, bromodichloromethane, and dibromochloromethane) and halogenated acetic acids (HAA5 – monochloro-, dichloro-, trichloro-, monobromo-, dibromo-) are widely occurring classes of Disinfection byproducts. The amount of TTHM and HAA5 in drinking water from one water system can change from day to day, depending on the season, water temperature, amount of chlorine added, the amount of plant material in the water, and a variety of other factors. All community water systems that chemically disinfect or purchase water that has been chemically disinfected are required to monitor for disinfection byproducts.

The Flint River has higher levels of organic material than water in the Great Lakes and as a result the water produced by the City developed higher disinfection byproducts than the water provided by DWSD. However, because the WTP was previously operating intermittently as an emergency backup supply with treated water being discharged to the Flint River rather than entering the distribution system, it was not possible to predict disinfection byproduct levels at distribution system compliance points until the City began relying on it continuously.

As mentioned previously, the City became aware that there were numerous broken valves and closed valves that should have been open in the distribution system. At this time, the City also began a mapping effort to identify "water age" in the distribution system. The longer the residence time or "water age" the greater the opportunity for the formation of disinfection byproducts.

2. How were the violations detected? What was the DEQ's response?

Disinfection byproducts are monitored at eight sites throughout the distribution system and ~~a locational~~ individual running annual average is calculated for each location. Because TTHM and HAA5 maximum contaminant levels (MCLs) are calculated based on a running annual average at specific distribution system locations, the actual violation of the federal SDWA standard did not occur until the fall of 2014. However, because it was apparent in the summer of 2014 that the standard would eventually be exceeded; the DEQ asked the City to proactively implement measures to address the problem before the violation required them to do so.

As a result of maintenance efforts undertaken by the City to repair valves and correct improperly closed valves, the City was able to improve water flow of the distribution system and thereby reduce residence time or "water age" in the system. Operational changes made to reduce the amount of storage in the system also helped reduce residence time which contributed to a reduction in disinfection byproduct formation.

In addition to operational changes to minimize residence time in the distribution system, the City added granular activated carbon to its filters in July 2015. Levels of TTHMs and HAA5s were reduced and the City returned to compliance on September 1, 2015.

VI. THE TASTE, ODOR, AND COLOR COMPLAINTS RECEIVED BY FLINT

1. What caused the taste, odor and color complaints received by the City from residents?

Taste, odor and color issues are very personalized. Water leaving the WTP did not have any unusual odor or color. In the City, during the summer after the switch to the Flint River as a water source, taste, odor, and color complaints increased. Increases in color, odor and changes in taste appeared to occur because of changes in hydraulic conditions within the distribution system. Construction in the distribution system, hydrant flushing, and changes in flow characteristics are all known causes of disturbances within the distribution system that can cause an increase in taste, odor and color. Aesthetics, such as taste, odor, and color, while a concern, by themselves are not a threat to public health.

2. What was the DEQ's response?

The DEQ consulted with the City regarding these complaints. The City indicated that they were offering to investigate such complaints for anyone that had issues. But City personnel informed the DEQ that they were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHMs, it was anticipated that there would be short term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) often causes temporary problems as described. Based on information from City personnel, it appeared that the complaints were related to such operational activities occurring in the distribution system.

VII. LEAD ISSUES IN THE FLINT DRINKING WATER

1. What causes lead in drinking water?

Lead is rarely found in source water. Lead enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead fixtures, and solder. Older homes built prior to World War II, are more likely to contain lead pipes. The most common problem with newer construction is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially hot water. The amount of lead in tap water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the pH of the water, and its temperature.

2. What is the Lead and Copper Rule?

Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. On June 7, 1991, the USEPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR). The treatment technique for the rule requires systems to monitor drinking water at customer taps. If the 90th percentile for lead exceeds an AL of 15 ppb or the 90th percentile for copper exceeds an AL of 1.3 parts per million (ppm), the system must undertake a number of additional actions to control corrosion. If the AL for lead is exceeded, the water supply must also inform the public about steps they should take to protect their health and the water supply may have to replace lead service lines under their control.

3. What is the lead action level (AL)?

For most contaminants, the USEPA sets an enforceable regulation called a maximum contaminant level (MCL) based on the MCL Goal (MCLG). MCLs are set as close to the MCLGs as possible, considering cost, benefits, and the ability of public water systems to detect and remove contaminants at the WTP using suitable treatment technologies. Although the maximum contaminant level goal for lead is zero, based upon the above factors, the USEPA has established the action level for lead at 15 ppb.

Because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, the USEPA established a treatment technique rather than an MCL for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to control a contaminant. The treatment technique regulation for lead requires water systems that produce drinking water to control the corrosivity of the water. The regulation also requires systems to collect customer tap samples from sites served by the system that are more likely to have plumbing materials containing lead. If the 90th percentile action level for lead is exceeded, then water systems are required to take additional actions including:

- Optimizing corrosion control treatment (for water systems serving greater than 50,000 people that have not fully optimized corrosion control).
- Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.
- Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

4. **Did DWSD have optimized corrosion control treatment?**

After the LCR passed in 1991, DWSD and all of its consecutive customer systems conducted two rounds of monitoring for lead and copper. Copper levels were well below AL limits, but lead levels exceeded the AL of 15 ppb in Detroit and many of its customer communities. As a result, DWSD installed corrosion control treatment. DWSD performed a corrosion control study and concluded that they could reduce the corrosivity of the water by the addition of an orthophosphate, a corrosion inhibitor.

5. **Did the DEQ require the City to have corrosion control in place when it switched to the Flint River as its source of drinking water?**

No. There are two ways under the LCR to deem a water supply as providing "optimal corrosion control" – either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment if it is needed. The DEQ requested that the City perform two 6-month rounds of monitoring to demonstrate if the City was practicing optimal corrosion control treatment. According to state regulations [R325.10604f(2)(b)(iii)], a system can demonstrate optimized corrosion controls by sampling in two, consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the Flint River has 0 ppb lead, the City would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods. However, once a system has installed treatment, it would also be considered optimized regardless of the 90th percentile level achieved, as long as it does not exceed the AL of 15 ppb.

In this case, the City had been purchasing water from DWSD that was treated for corrosion control. It was the DWSD water system that was considered as having optimized corrosion control at that point. Since the City water system had not been the supplier of water before, the DEQ did not require the City to maintain corrosion control for which it was not responsible [R325.10604f(2)(b)]. It could not "maintain" operations undertaken elsewhere by a different entity for a different source of water. The DEQ's instructions to the City were consistent with its past practices afforded to all other large water systems. At the beginning of the LCR, all large systems were initially granted the option to demonstrate optimal corrosion control treatment through full-scale monitoring under the applicable rules. For these reasons, two 6-month rounds of monitoring, as required by the LCR were the required means to determine whether or not optimal corrosion control was being achieved.

6. **How does the DEQ calculate the 90th percentile?**

To determine the 90th percentile of a list of lead or copper results, the procedure below is followed:
Step 1: Place lead or copper results in ascending order
Step 2: Assign each sample a number, 1 for lowest value
Step 3: Multiply the total number of samples by 0.9 – this yields the 90th percentile sample. For example: 20 samples x 0.9 = 18th sample. This is the 90th percentile level.

Calculating the 90th percentile is easiest when a supply collects 10 samples (or a multiple of 10). Note that the 90th percentile must be interpolated if the number of samples is not a multiple of 10.

7. What was the result of the first round of monitoring conducted by the City?

The first 6-month round of lead and copper monitoring conducted by the City ended on December 31, 2014. One hundred samples were submitted and the 90th percentile lead level was calculated to be 6 ppb. The next step required by the DEQ was for the City to collect a second round of monitoring.

8. What was the result of the second round of monitoring conducted by Flint?

The second 6-month round of lead and copper monitoring conducted by the City ended on June 30, 2015. Sixty-nine samples that complied with the site selection criteria were submitted and the 90th percentile lead level was calculated to be 11 ppb. The conclusion from these results was that the City, while in compliance with the AL, exceeded the level required to be deemed as having optimized corrosion control.

9. Why was the City required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of Act 399.

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples the City was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census, which listed the City's population as more than 100,000 residents. In March of 2015, the City provided updated information that indicated the City's population had decreased to less than 100,000. Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

10. What actions did the DEQ order the City to undertake after the second round of monitoring?

While the City's LCR compliance monitoring continued to meet AL requirements, the City exceeded the level required to be deemed as having optimized corrosion control. Following

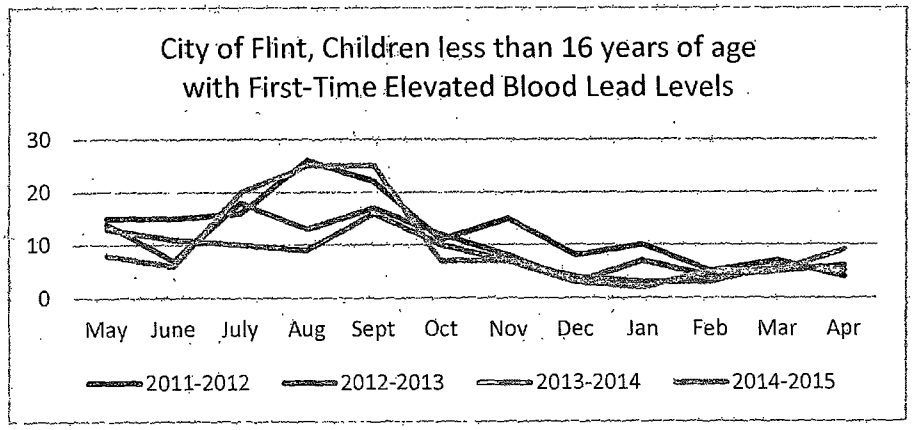
receipt of the City's compliance monitoring results, the DEQ sent a letter on August 17, 2015 requiring the City to install corrosion control treatment.

Under the LCR, the City has 6 months to let the DEQ know whether it intends to conduct a study, then 18 months to perform the study and make its recommendation, and 24 months to complete installation of the selected corrosion control. The DEQ requested the City accelerate this schedule. The City submitted plans and specifications to install corrosion control treatment and a construction permit was issued by the DEQ on October 28, 2015. The City is in the process of installing the necessary equipment and procuring the appropriate chemicals. Treatment is expected to be on-line by the end of November 2015. As of October 16, 2015, the City resumed purchasing water from DWSD that is already optimized and provides a corrosion inhibitor. The City treatment will further enhance the amount of inhibitor in the system.

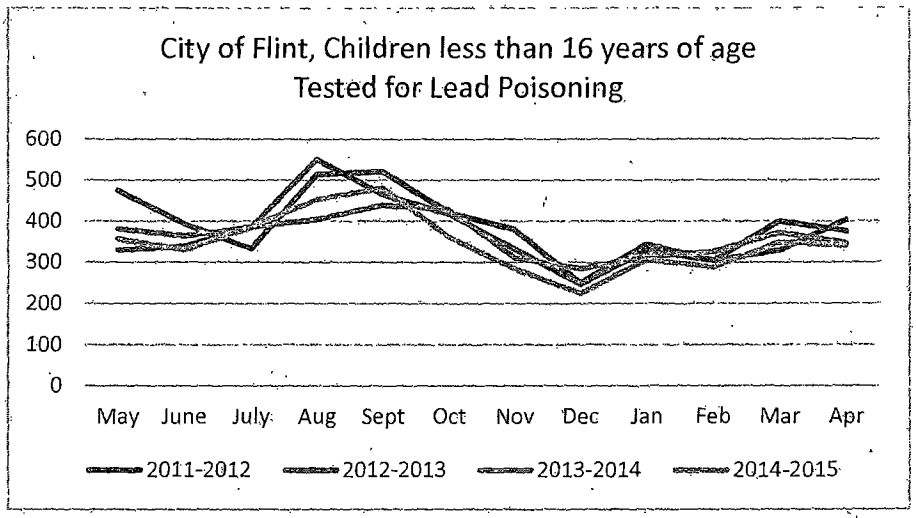
11. What had Department of Health and Human Services (DHHS) advised the DEQ regarding blood lead levels prior to the DEQ ordering the City to implement optimized corrosion control?

In an e-mail dated July 28, 2015 regarding blood lead testing, the Michigan DHHS indicated that they...

> "compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –
>
> • Lead testing rates remained about the same from year-to-year (chart on the right).



> • There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).



- However, that pattern was not terribly different from what we saw in the previous three years; especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).

- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspected that the summer data spike may be related to this effect.

- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015."

This e-mail from DHHS in concert with the completion of two 6-month rounds of lead compliance sampling data indicating that the City had not exceeded an AL for lead provided the basis for the DEQ to maintain that the water in the City continued to be in compliance with the federal SDWA and was safe for consumption.

12. When did the DEQ first become aware of allegations of elevated blood levels being detected in certain children?

The DEQ was notified on August 23, 2015, by a professor from Virginia Tech that "over the next few months we will be studying Flint water quality issues..." and similarly notified by the USEPA on August 28, 2015. Results indicating elevated lead levels in homes were reported as part of this study in late August. In September 2015, information was reported in news articles that pediatricians in the City had data suggesting an increase in children's blood lead levels in two zip codes in the Flint area.

Prior to these dates, the City had already completed the required two 6-month rounds of monitoring and a determination had been made by the DEQ that the City must install corrosion control treatment as documented in correspondence dated August 17, 2015.

VIII. QUESTIONS RAISED REGARDING THE DEQ'S ACTIONS

1. **What was the DEQ's response to the USEPA's inquiry in February 2015 regarding the optimized corrosion control treatment being implemented by the City under the LCR?**

   The DEQ indicated that the City was in compliance with the LCR, and 90th percentile levels were below the AL of 15 ppb. The City was already conducting the second round of monitoring which would provide for a determination of whether additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the LCR that lead results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile AL in the LCR.

2. **Did the DEQ attempt to mislead the USEPA in a February 27, 2015, e-mail responding to the USEPA's inquiry regarding Optimal Corrosion Control Treatment (OCCT)?**

   No. There was no attempt by the DEQ to mislead the USEPA. There is an e-mail from Steve Busch, Jackson and Lansing District Supervisor, Office of Drinking Water and Municipal Assistance, indicating that the City was practicing a corrosion control program. What was meant was that the City was performing the required monitoring to determine whether or not they were practicing optimized corrosion control. The DEQ subsequently clarified its position in follow-up e-mails and telephone conversations with the USEPA.

3. **When General Motors announced its intent to terminate water service from the City and purchase water from Genesee County, shouldn't this have been a sign that there were concerns with the quality of the water after the switch to the Flint River?**

   No. General Motors made a decision regarding the quality of water for its manufacturing processes. At the time, the company indicated that the chloride levels were above limits acceptable as part of the manufacturing facility's limit for production purposes. The level of chlorides in the water treated by the City was not a human health or aesthetic concern.

   Chloride does have a secondary maximum contaminant level (MCL) established by the USEPA, not for health-related concerns but rather for taste and aesthetic concerns. According to the City's records, the treated water chloride concentration leaving the water treatment plant ranged between 55 and 65 mg/l (milligrams per liter). Concentrations greater than the secondary MCL of 250 mg/l become objectionable due to taste. It should be noted that the City does use ferric chloride as its primary coagulant and this does add some chloride to the finished water. The chloride concentration in the Flint River water is generally about 45 mg/l; the contribution from ferric chloride is not significant.

4. **Has the USEPA subsequently admitted that the LCR is subject to differing interpretations such as that presented by the DEQ?**

Yes. On November 3, 2015, the USEPA issued a Memorandum to all 50 states regarding the "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems". This memorandum addresses concerns raised about the application of the LCR, specifically the requirements pertaining to maintenance of OCCT, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. The USEPA states that this type of situation rarely arises, that the language of the LCR does not specifically discuss such circumstances, and that there are differing possible interpretations of the LCR with respect to how the rule's OCCT procedures apply to this situation. The memo is intended to clarify prospectively steps agencies should take or apply in the future. USEPA's new guidance provides acknowledgement that the LCR is subject to differing interpretations. The DEQ's interpretation and application of the LCR in this situation was in compliance with the federal SDWA and Act 399.

5. **Did the DEQ reject any of the samples submitted by the City?**

Yes, samples at two locations were excluded from the compliance calculation in conformance with rules issued by the USEPA.

According to the LCR, compliance samples must be a first draw, 1-liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted high-risk sampling sites, called Tier 1 sampling sites. For a municipality such as the City, the Tier 1 sampling pool must consist of single family structures that are:

- served by a lead service line,
- contain lead pipes, or
- contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

As long as a community has Tier 1 sites that contain lead services, they are required to collect at least 50 percent of their compliance samples from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters, etc.

One of the samples submitted by the City was excluded from the 90th percentile compliance calculation in the latest monitoring period because it was taken from a tap at a non-residential site (non-Tier 1). The other sample result that was removed was collected from a single family home that has a whole house treatment system. Both of these sites are, therefore, excluded from the compliance consideration based upon federal rules. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point-of-use or point-of-entry treatment can only be used if the community has insufficient Tier 1 sites available.

6. **Did the DEQ review the information submitted by the City to ensure all samples were from Tier 1 sites?**

Yes. The DEQ examined the information submitted and certified by the City that its LCR compliance monitoring sites consisted entirely of Tier 1 criteria sites, which met the requirements of this rule to maximize sampling of high-risk targeted sites.

During the initial implementation of the LCR approximately 25 years ago, water supplies were required to complete a materials evaluation of their distribution system to identify a pool of targeted, high-risk sampling sites. These sites were to be categorized into one of three tiers (1, 2, or 3) based on risk. The DEQ created an LCR reporting template for water systems to identify each compliance sampling site by Tier, service line material, and building plumbing material.

If a water system has sufficient Tier 1 sites, they are required to sample them before using any lower Tier sites. Furthermore, if they have sufficient sampling sites with lead service lines, they are required to use them to make up at least 50 percent of their sampling pool each monitoring period. Water supplies are also required to use the same sampling sites each time or explain on their LCR reporting form why they were unable to do so. Finally, the water system is required to certify all of the information they provide on the LCR reporting form is factual.

The DEQ must rely upon the public water system to identify appropriate sampling sites for LCR monitoring. The DEQ public water supply program has no control or authority over service lines or domestic plumbing. As a result, we have no records on construction standards or materials used by customers for these components. If these records exist, they are kept by plumbing code enforcement officials.

In 2015, City employees again certified that the information submitted on their LCR monitoring reports for the two 6-month rounds of monitoring conducted after they began treating the Flint River were accurate, and DEQ staff review of that information indicated it was in compliance with the monitoring requirements. It was not until the DEQ heard City employees revealing to the media that the City did not know for certain if its compliance monitoring was collected from homes with lead service lines. As a result, the DEQ began to investigate their monitoring sites. As the City began to transfer its customer information to electronic records, the DEQ determined from the information available that a significant number of these sites that had been listed as having lead service lines either did not have them or the information was unavailable. On November 9, 2015, the DEQ notified the City in writing that it would be necessary to conduct a complete assessment of its sampling pool and report back its findings by December 30, 2015. The DEQ is now awaiting the City's response.

7. **Did the DEQ believe the levels of lead found at 212 Browning in April 2015 were indicative of a system-wide problem?**

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The City replaced the lead service line May 6, 2015. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem, and subsequent sampling taken at this address

showed that replacement of the service line did mitigate the problem. There was, therefore, no reason to believe that this was indicative of a system-wide problem.

8. Do the DEQ's sampling instructions comply with the LCR?

We continue to seek official clarification from USEPA regarding the sampling protocols. We have attempted to ensure compliance with the USEPA's guidance provided in the preamble to their lead and copper regulations that said that household use should be "typical" for a residential customer on the day before sample collection for lead and copper. Early in the implementation of the LCR, we had encountered too many situations where compliance samples had been collected from kitchen and bathroom taps that had not been used in days and in some cases, even weeks, resulting in excessively stagnated water and correspondingly high lead levels that did not represent typical exposure expected after overnight stagnation. To incorporate these results into further regulatory decision making could have led to actions that were not indicative of a true public health threat. Further complicating this issue was the USEPA's direct implementation of the LCR in Washington, D.C., where it was learned that some "valid" lead results were not always being included in compliance calculations. Subsequently, the USEPA made invalidation of samples for any reason much more difficult. In order to ensure samples were taken at customer taps representative of typical use, we devised our current recommendations for ensuring appropriate but not excessive stagnation for LCR monitoring.

We continue to believe it is appropriate to ensure that taps being sampled are representative of typical household use and are sampled during the recommended stagnation period of 6-18 hours. The LCR does not say the result should represent the "absolute worst case" condition – it talks about sampling the highest risk locations (lead plumbing, lead service lines, high lead content solder piping, etc.) after overnight stagnation and then collecting a first draw sample so as not to flush elevated lead from that tap at that point in time. There are a number of other States that share DEQ's interpretation of the rule and the DEQ encourages USEPA to provide official clarification directed at all States with primacy.

9. Does the DEQ require the use of small-neck bottles to obtain samples?

No. The DEQ does not mandate the use of small-neck bottles; it is the sampling method that is specified in both the federal SDWA and Act 399. Each certified drinking water laboratory provides bottles to their customers upon request for any particular analysis in accordance with the specifications in the SDWA. The bottles provided by the DEQ Drinking Water Laboratory for a lead and copper corrosion control sample meet these requirements.

Draft –Not for Distribution 01/04/2016

TAKING ACTION ON FLINT WATER

[I would start off with an apology..."Among the things our citizens have a right to expect from their government is clean, safe water. In Flint's case, government failed them on many levels. As the Chief Executive of the state, I apologize for these failures and am absolutely committed to making things right. I would ask that all of our leaders at the local, state and federal level, work with me to solve the immediate problems and put in place long term measures to monitor and address the consequences from exposure. I also want to thank Dr. Mona Attisha Hannah and Dr. Marc Edwards for their diligence in making sure I understood the severity of the problem before us.]

- Every municipality in Michigan deserves safe drinking water.
- The issue in Flint is the failure of Government to ensure safe drinking water. The aging infrastructure exacerbated that failure, and serves as the canary in the coal mine regarding the need for the legislature to address water and sewage infrastructure statewide. As Governor, I am committed to addressing the issue.
- Lead exposure is a serious issue.
- I appreciate those who have brought attention to this issue.
- We are committed to safe drinking water and to working in partnership with the city of Flint, Genesee County and the U.S. EPA.
- We must learn from what happened in Flint.
- **In October, I announced a ten point action plan to address lead exposure in Flint.**
- **Today, I am outlining additional actions to make sure the public health is protected in Flint and elsewhere in the State of Michigan.**
- **I am asking for changes in order to see that the Michigan Drinking Water Program becomes a national leader in public health protection.**

On October 2, 2015, the Flint Water Action Plan was announced. With the help of the Michigan Legislature and the Mott Foundation, we have taken significant action to address the issue. Actions include:

- **Temporarily switching back to the Great Lakes Water Authority/DWSD water supply until KWA is online. (October 16, 2015)**
- Provided water filters to resident of Flint. (DHHS to provide update) "Distribution has been a problem, are we addressing it?"
- Testing all Flint schools, preschools and day cares.
    - To date, all 13 facilities within the Flint Community Schools have undergone an initial plumbing evaluation to determine lead exposure risks. The results of these evaluations show that the primary source of exposure is from fixtures such as faucets and fountain heads. This is good news as these are relatively easy and inexpensive to replace compared to plumbing deep within the system. Once these fixtures have been replaced, additional testing will be conducted to ensure that the issues have been properly addressed. This free service is also being

offered to all private schools and daycare facilities using the Flint water system and testing of those facilities will begin in January.

- Expanded health exposure testing of individual residences. Summary of results to date. (Nick to provide)
- Offer water testing at no cost to Flint residents to assure safe water.
    - Flint residents have been offered free lead testing of the water in their home. To date, over 600 samples have been tested. While the overall results are encouraging and show that lead levels are beginning to trend downwards, there are still some results that show elevated levels that are very concerning. Since lead levels in water can vary greatly from home to home it is important that all Flint residents take advantage of this free testing. In addition all Flint residents should continue to use the filtration devices that have been provided free of charge until such time that a complete evaluation of the water system shows it to be in compliance with Federal standards.
- Expedite optimizing corrosion control in the Flint drinking water system. Summary of date completed.
    - On October 16th of 2015, the city of Flint moved back to using water from the Detroit Water and Sewer Department (DWSD) which is treated with phosphate to control corrosion. On December 9th the City of Flint began supplemental phosphate addition to the water to accelerate the rebuilding of the protective layer in the water distribution system. Additional work is also being done to ensure that appropriate corrosion controls are in place for when the city of Flint moves to the Karegnondi Water Authority (KWA) for their source water. It is important to note that the water from the KWA will be coming from Lake Huron just like the water from the DWSD and the characteristics of the water will be similar.
- Utilize the "Safe Drinking Water Technical Advisory Committee." To ensure the best technology, practices and science are being utilized; national experts have been assembled to provide technical advice. "Will you include Dr. Mona? Larry Reynolds? Mark Edwards?"
- Accelerate water system improvement to address replacement of lead service lines. We are working with the city of Flint and our Congressional delegation on a lead service line replacement plan.
- Working to expedite the completion of the Karegnondi Water Authority. And to provide the expertise to upgrade the water treatment facility in Flint to ensure that the drinking water from KWA is at least the same quality as the water from GLWA/DWSD
- Expand a lead education program.
(DHHS to provide update)
- Dr. Eden Wells was named as the Flint Drinking Water Public Health Advisor to ensure safe drinking water.
- Flint's Head of Mott Children's Hospital, Dr. Larry Reynolds was named to the Flint After Action Task Force].

In addition to the announced Flint Action plan, I am calling for additional actions to be taken.

- Recently appointed Harvey Hollins to serve as my administration's point person to coordinate ongoing activities and partner with the city of Flint. Harvey will be supported by senior members of my executive team to remove impediments and ensure efficient coordination at all levels.
- Asking the DEQ to develop a statewide drinking water school testing program.
- Asking for changes in the Michigan Drinking Water Program in order for it to be recognized as a national leader in public health including:
    - New administrative leadership.
    - Creation of corrosion control expertise.
    - Expanded statewide testing.
    - Improved testing protocols.
- The creation of a health fund for children affected by lead exposure.
- Calling on the Legislature to work with my administration and stakeholders to develop a Strategic Water Fund to address Michigan's long term safe water and water quality infrastructure needs. This can't get lost. Need more to educate people that our infrastructure is old, that the average city of 50,000 or more likely requires $$$ in remediation. At some point the anti corrosive treatment is not likely to be sufficient
- I will look to implement additional recommendations of the Flint Water Advisory Task Force, and I appreciate their leadership on this issue. I would say more here—the Task Force was bi-partisan, independent, and staffed by incredible talent. It has done an incredible job
- Ensure transparency for the public regarding actions taken in Flint to resolve this crisis.

Krisztian, George (DEQ)

From: Crooks, Jennifer <crooks.jennifer@epa.gov>
Sent: Thursday, September 10, 2015 5:58 PM
To: Shekter Smith, Liane (DEQ)
Cc: Benzie, Richard (DEQ); Busch, Stephen (DEQ); Prysby, Mike (DEQ); Poy, Thomas; Porter, Andrea; Devereaux, Tracy Jo (DEQ); Kuefler, Janet; Shoven, Heather; Deltoral, Miguel
Subject: Final Notes from call Tuesday 8/31/15 with MI DEQ RE: Flint

Thank you, Liane, for your edits—I incorporated all of your edits, and further clarified who said what.
Jennifer

Date: August 31, 2015
Present: Liane Shekter Smith, Richard Benzie, Steve Busch, (2 other MDEQ staff?), Tom Poy, Andrea Porter, Janet Kuefler, Jennifer Crooks

STRATEGIC NEXT STEPS FOR FLINT TO ADDRESS LEAD CORROSION CONCERNS

Tom Poy discussed Marc Edwards' website, "Flint, MI Water Study Updates" (https://flintwaterstudyupdates.wordpress.com/). The discussion focused on the lead sampling and analytical results Marc Edwards' team posted to their website. Tom emphasized that EPA is not involved with Marc Edwards' work in Flint. Tom mentioned that the Edwards team's samples may not have been analyzed by a certified lab (which is only required for compliance samples) nor taken from sites that qualify as Tier 1 for LCR compliance sampling, but the results give further evidence that lead levels in Flint are trending upward. (The conclusion that there is an increasing trend of lead concentrations at consumer taps builds upon earlier compliance sampling taken by Flint in 2014 and 2015 that showed the 90th percentile of the 1st 6-month sampling period at 6ppb, then the 90th percentile of the 2nd 6-month sampling period at 11ppb.) Everyone at the meeting agreed that Flint is in compliance with the Safe Drinking water Act action level for lead. However, because the city's population exceeds 50,000 persons, MDEQ stated that Flint needs to additionally optimize their treatment process to reduce lead levels further, if possible.

The "Flint, MI Water Study Updates" website is putting added pressure on MDEQ and EPA to ensure that Flint addresses their lack of optimized corrosion control treatment in an expedited manner in order to protect the residents from exposure to high lead levels. Richard noted that there are numerous systems across the country that have installed corrosion control treatment, have optimized their corrosion control, but did not necessarily reduce their lead levels. We all acknowledged that this is true. MDEQ acknowledged that implementing installation of corrosion control treatment in Flint is prudent to protect public health since there are approximately 15,000 lead service lines within the city. EPA acknowledged that to delay installation of corrosion control treatment in Flint would likely cause even higher levels of lead over time as Flint's many lead service lines are continuously in contact with corrosive water.

Region 5 and MDEQ brainstormed on strategic next steps for Flint to address lead corrosion concerns. These steps included:

1. **Public Education for Flint Residents.** Liane has contacted the Department of Community Health to discuss developing a consumer lead education piece outlining the consumer's options to lower the lead in their drinking water. The Region was glad to hear of a plan to initiate Lead Public Education since this will provide the public immediate actions they can take. The educational material could include steps consumers can take to reduce their exposure to lead in drinking water (flushing their lines after long stagnation periods, using filters certified to remove lead, etc.) as well as longer term fixes to remove lead sources (for example, financing the cost to

remove any part of a lead service line on the owner's property at the same time as Flint is replacing its portion of the lead service line).

2. **Gathering Information on Flint's Future Treatment Plans.** Steve Busch said Flint and their engineering consultants were meeting this week (Sept 1) to discuss conceptually the necessary optimized corrosion control treatment at Flint. Tom Poy shared EPA lead experts' (Mike Schock and Darren Lytle of EPA's Office of Research and Development in Cincinnati) caution against simply adding orthophosphate without first studying the water quality and existing distribution system conditions to ensure that any installed treatment has a good chance of working. EPA lead experts have research and field experience showing the complexity of optimizing corrosion control treatment when water quality is significantly changed, as is the case for Flint.
3. **Offering Flint Free Help from EPA Experts.** Steve Busch has already provided the names of EPA lead experts (Mike Schock and Darren Lytle) to Flint, as has Susan Hedman, R5 Administrator. MDEQ and Region 5 agree that, to successfully control lead corrosion in the distribution system, Flint needs to review this situation holistically, while also addressing the lead issue in an expedited manner.
4. **Laying Groundwork for MDEQ/EPA Collaboration with Flint.** If Flint accepts the offer of technical assistance for optimizing corrosion control, Tom Poy suggested that MDEQ and EPA lead experts (Mike Schock and Darren Lytle) form a partnership to provide such help. EPA experts are able to provide pipe scale analyses, as well as other laboratory support. Although Flint (using their consultant) bears the ultimate responsibility for designing and installing corrosion control, MDEQ and EPA experts are willing and able to provide advice throughout the process.

END

Jennifer

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City of Flint Water
Action Steps for Week of November 2-6

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Conduct After Action Plan	DEQ	George Krisztian	Meeting held on 10/29/15 to discuss time line
2.	Introduce legislative changes to Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone George Krisztian Sonya Butler	Draft language submitted to Maggie Pallone for review
3.	Assist After Action Review Panel	DEQ	Madhu Anderson George Krisztian Karen Tommasulo	Panel created and press release issued on 10/21/15
4.	Staff hiring plan	DEQ	Jim Sygo Maggie Pallone George Krisztian	Negotiations underway to contract with the Genesee County Health Department
5.	Finalize fiscal year 2017 budget request	DEQ	Maggie Pallone George Krisztian	
6.	Meeting(s) with school staff/management	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	A summary report for Freeman Elementary School has been drafted
7.	Contact DHHS regarding lead education material for schools; provide information as requested by DHHS	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	Meeting held on 10/27/15; action items created
8.	Follow up with city of Flint regarding corrosion control treatment and their plans to address requirements and options provided for in 10/30/15 DEQ letter	DEQ and EPA	Jim Sygo Steve Busch Pat Cook Mike Prysby	

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
9.	E-mail city of Flint regarding timing to install corrosion control now that the construction permit has been issued	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	E-mailed city of Flint on 11/4/15; 11/5/15 response indicated equipment to be ordered and plan to start installing feed piping on 11/9/15
10.	Review Monthly Operation Reports (MORs) for Standby Operation of Flint Water Treatment Plant with city of Flint; draft letter to city of Flint documenting Standby Operation requirements	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Letter is drafted and will be sent to city of Flint the week of 11/9/15; MOR review with city of Flint will be conducted during next routine site visit
11.	Work with Karegnondi Water Authority (KWA) and other agencies to address bottleneck issues; check weekly for status update	DEQ and KWA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Issues regarding soil erosion controls during construction are being addressed
12.	Continue evaluating city of Flint Service Line Record status and comparison to sampling pool	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Letter requesting additional information/documentation to be provided to city of Flint on 11/9/15
13.	Provide DHHS with any available cross-reference information regarding lead service lines and plumbing materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
14.	Develop childcare facility guidance or review DHHS-related materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	Meeting held on 10/27/15; DHHS to provide materials
15.	Develop draft sampling protocol for residential exposure assessment for DHHS	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook	Draft document under development; discussed preliminary plan with DHHS

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
			Mike Prysby	
16.	Make progress on drafting a generic school sampling guidance document for statewide distribution; target audience: schools served by municipal water	DEQ and LARA	Jim Sygo Steve Busch Richard Benzie	Draft document under development to make it an easy-to-read and follow guidance document
17.	Attend 11/5/15 meeting arranged by DHHS regarding residential elevated blood lead investigations and water testing	DEQ and DHHS	Jim Sygo George Krisztian Steve Busch	Done

Flint Drinking Water Action Plan Update

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

Key Actions:

- The city of Flint has received the necessary building permits to move forward with plans for the supplemental addition of phosphate to water that is coming from the Detroit Water and Sewerage Department. The purpose of the supplemental addition of phosphate is to reestablish the protective coating throughout the distribution system. This protective coating slows the leaching process of lead from service lines, household fixtures, and solder used for connecting copper pipes. The city of Flint has made the purchase of the necessary equipment a high priority and hopes to have the pumps installed and running within the next month.

- The report for Freeman Elementary School that documents and explains the results of the plumbing evaluation conducted by the DEQ and DLARA has been completed and will be distributed on November 9. The report demonstrates that the issues in the school are fixture-specific and that there was no evidence found to suggest that significant lead contamination is occurring deep within the plumbing system. The report will recommend replacement of fixtures that were found to have lead levels exceeding 15 parts per billion. Once a press release has been issued, the report will be posted to the Flint water Web site: www.mi.gov/flintwater.

- Data for residents of the city of Flint have been compiled into spreadsheets that sort the data by ZIP Code and also by concentration. The data to date indicate that the issue of lead contamination is not system-wide but is site specific. Over three quarters of the samples showed lead levels of 5 parts per billion or less and over 91 percent of the samples were at levels of 15 parts per billion or less. These spreadsheets will also be posted to the Flint water Web site.

Positions:

- With respect to the school data and the samples submitted by residents through the free lead testing program, the issue of lead contamination in the water appears to be site specific. In both cases, the water within the distribution system does not appear to be the issue. The contamination appears to be coming from fixtures, solder used to connect copper, and from lead service lines. While the initial results are encouraging and show that the large majority of homes do not have an issue, it is important that residents do not make assumptions. The only way to know if water contains lead is to have it tested.

Concerns:

- The action level of 15 parts per billion that is used in the lead and copper rule (LCR) was set up to determine if a supply was utilizing optimized corrosion controls. It was not meant to serve as a health-based exposure model. The

DEQ will be releasing data on Freeman Elementary School and residential data on November 9. The DHHS is currently working on evaluating blood lead levels on children in the city of Flint. It is important that when the DHHS is ready to present their data that the message they present does not inadvertently contradict information provided by the DEQ. While it is recognized that the ultimate goal is to have no detectable amount of lead in the water, this goal may not be practical as the DEQ utilizes the criteria as specified by the U.S. Environmental Protection Agency (EPA).

- The State of Michigan is being criticized as a result of recent information coming to light that a significant number of samples were not collected from proper sampling locations as part of the sampling program in the city of Flint to demonstrate compliance with the LCR under Michigan's Safe Drinking Water Act, 1976 PA 399, as amended (Act 399). Recently the city of Flint began to electronically convert customer service line information. This effort, along with statements by some of the city of Flint's certified operators, directly conflicts with information certified by the city of Flint in documents referred to as LCR compliance monitoring certification reports.

- Correspondence is drafted and will be sent to the city of Flint requesting that they provide appropriate documentation to demonstrate that the sampling locations selected and certified by the city of Flint comply with Act 399. In the absence of appropriate justification/documentation, the city of Flint may be subject to enforcement for violation of Act 399.

Significant Event:

- On November 3 the EPA issued a memorandum to address "certain concerns raised about the application of the [federal] 1991 Lead and Copper Rule, specifically the requirements pertaining to maintenance of optimal corrosion control treatment, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source." This EPA memorandum further states: "This type of situation rarely arises and the language of the LCR does not specifically discuss such circumstances. After reviewing the rule with our Office of General Counsel, it appears that there are differing possible interpretations of the LCR with respect to how the rule's optimal corrosion control treatment procedures apply to this situation...." This EPA memorandum clarifies the requirements should a situation like Flint occur again in the future. However, it clearly recognizes that the options chosen by Michigan were one interpretation or option of the LCR.

Changes from Previous Report:

- Staff e-mailed Michael Glasgow and Brent Wright of the city of Flint on November 4 to request a time line and a request to notify the DEQ when the phosphate equipment is installed. Mr. Wright responded on November 5 noting

that the city of Flint just received the Act 399 permit in the mail on November 5. Equipment is to be ordered by November 6, and the Flint Water Treatment Plant operators plan to start installing the feed piping on November 9.

- A letter detailing standby operation requirements is currently being prepared by the DEQ and will be sent to the city of Flint during the week of November 9. A review of the standby operation monthly operation reports with the city of Flint will be conducted during the next routine site visit at the Flint Water Treatment Plant.

- A letter has been prepared that requests the city of Flint to provide additional information and documentation regarding all of their historic LCR compliance sampling sites and to compare the service line information reported on the LCR compliance monitoring certification reports against the service line information from the city of Flint's digitized index cards. Conflicts noted between the index cards and the LCR compliance monitoring certification will need further explanation, and the city of Flint will need to provide supporting documentation demonstrating these sites meet Tier 1 criteria. The letter will be provided to the city of Flint on November 9.

- The draft document for sampling protocol for residential exposure assessment is under development. DEQ staff discussed the preliminary plan with DHHS staff.

- The draft document for generic school sampling guidance for statewide distribution is under development. Staff is working on making this an easy-to-read and follow guidance document.

- DEQ staff met with DHHS staff on November 5 to discuss residential elevated blood lead investigations and a protocol for water testing.

Other Items:

- As provided by the DHHS, the purchased total water filter/pitcher distribution through November 6 is 13,649 units.

- Attached are the:
  - Final report for the plumbing evaluation of Freeman Elementary School
  - Spreadsheets that consolidate the lead and copper data for Freeman Elementary School
  - Consolidated spreadsheets for water samples submitted by Flint residents sorted by ZIP Code and sorted by concentration

Prepared by: George Krisztian, Flint Action Plan Coordinator
Laboratory Director
Department of Environmental Quality
Telephone: 517-284-6719
Cell: PPI
November 9, 2015

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGIONAL ADMINISTRATOR
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

MEMORANDUM

DATE: November 4, 2015

SUBJECT: Transmittal of Final Report - High Lead at Three Residences in Flint, Michigan

FROM: Tinka G. Hyde
Water Division Director

TO: Jim Sygo
Deputy Director
Michigan Department of Environmental Quality

Howard Croft
Director of Flint Public Works

Enclosed please find for your file a final redacted version of a report prepared by EPA Scientist, Miguel Del Toral, regarding lead in drinking water at three residences in Flint, Michigan. The redactions remove personally identifiable and medical information. This report has been finalized and is also being provided to the National Drinking Water Advisory Council (NDWAC) for discussion during their upcoming meeting on November 17-19, 2015. We understand you saw an earlier version of this document; and note that most of the recommendations in that interim report are already being implemented (e.g., the City of Flint has switched back to Detroit water; filters have been provided to residents; and additional corrosion control treatment will be implemented).

The final report contains important new information indicating that physical disturbances of lead service lines can dislodge the protective coating that prevents lead from leaching into drinking water. The final report recommends notifying residents about the potential risks of increased lead levels in drinking water when work is undertaken that may disturb lead service lines.

cc: Natasha L. Henderson, City of Flint Administrator

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High Lead Levels in Flint, Michigan

The purpose of this report is to present the findings of activities conducted in response to high lead levels in drinking water reported to the United States Environmental Protection Agency Region 5 Office (EPA) by a resident in the City of Flint, Michigan.

Background Information

Prior to April 30, 2014, the City of Flint purchased water from the City of Detroit. On April 30, 2014, the City of Flint switched from utilizing purchased water from Detroit to a new water source, the Flint River. Subsequent to the change in source water, the City of Flint experienced a number of water quality issues resulting in violations of National Primary Drinking Water Regulations (NPDWR) including acute and non-acute Coliform Maximum Contaminant Level (MCL) violations and Total Trihalomethanes (TTHM) MCL violations (see Appendix A).

Beginning in January 2015, [redacted], a resident of Flint, called the Flint Water Department (FWD) regarding the water quality in her home. In response to the initial and subsequent calls, the FWD visited the [redacted] home on a number of occasions and also collected tap water samples. [redacted] also contacted EPA regarding these same water quality issues and medical issues she believes are associated with the water quality in Flint.

Following initial calls on the general water quality, on February 26, 2015, [redacted] contacted EPA regarding high lead levels found in her drinking water by the City of Flint. The result of the initial lead in water sample collected by the City of Flint on February 18, 2015 from the [redacted] home was 104 µg/L and the level of iron in the water exceeded the capability of the instrument to measure (>3.3 mg/L). On February 26, 2015, upon receiving the lead results from [redacted], the EPA contacted the Michigan Department of Environmental Quality (MDEQ) regarding the high lead result. The MDEQ advised that the City of Flint collect a follow-up sample for lead at the [redacted] home.

On March 3, 2015, the City of Flint collected a follow-up sample for lead at the [redacted] residence and the result of this second sample was 397 µg/L[1]. Subsequent to receiving her second result, EPA spoke to [redacted] via phone on March 19, 2015, and the following information was provided by [redacted]:

- The [redacted] home is a HUD home which was gutted and renovated in 2011. All existing plumbing had been removed and the [redacted] installed plastic plumbing.
- Due to high iron levels in the tap water, the [redacted] installed an iron filter downstream of the service line inlet into the home.
- [redacted] indicated that at this time they are not drinking the water or using it for cooking. She stated that her child's blood lead level (BLL) was originally at [redacted] in 2012 and that a more recent test showed it had increased to [redacted], but she noted that

[1] *Note: A third water sample had been collected on April 2, 2015, but the results had not been provided to the [redacted] at the time the interim report was written. The third lead in water sample result was 707 µg/L*

the BLL testing was done well after the child had stopped drinking the water and may have been higher during the time the child was consuming the water.

- Water samples collected by the City of Flint from her home were collected from the kitchen tap after the iron filter was physically removed.
- The Flint Water Department (FWD) informed [redacted] that her service line does not connect to the water main in front of her home as is typically the case for most homes.
- On March 18, 2015, City of Flint personnel went to the [redacted] home to locate the external shut-off valve in conjunction with the planned replacement of the [redacted] service line and were unsuccessful. Eventually it was discovered that the external shut-off valve was located at the corner of [redacted] and Bryant Street, two houses down from the [redacted] home.

As part of EPA's effort to respond to [redacted] concerns regarding her water results, EPA contacted the FWD. The following information was provided to EPA by the FWD:

- [redacted] home is one of the first homes built on the block and the service line runs for approximately 50-60 yards, connecting to the water main on Bryant Street which runs perpendicular to [redacted] (see Appendix A).
- Flint has a large number of lead service lines, so it would not be surprising to find that this is a very long lead line.
- The first sample from the [redacted] home was collected with the iron filter in place, and the second was with the iron filter physically removed. The iron filter was located just after the water meter.
- [redacted] showed FWD a video of her son 10 minutes after taking a bath, and that he had a full body rash in the video.

It was a common practice in the early 1900s to purchase large parcels of land and later subdivide them. Since service lines are typically run from the water main to the nearest location on a property and it is possible that the [redacted] home may have originally been part of a larger parcel of land that encompassed the two homes that now exist adjacent to the [redacted] home and was subsequently divided, leaving the original home connected to the same service connection and water main, while the newer homes were connected to a more recent water main installed along [redacted].

Based on a suspected conflict of interest at the healthcare facility that originally tested her son's BLL, [redacted] took her son to a different healthcare facility to have his blood lead tested again. On April 1, 2015, [redacted] provided EPA with a copy of her child's blood lead testing performed on March 27, 2015, showing a higher BLL ([redacted]) than the original test.

Due to the persistently high lead results, the FWD shut off the water service to the [redacted] home on April 3, 2015. Per agreement between the FWD and [redacted], her home was then connected to her neighbor's home via a garden hose, from one hose bib to another. This was understood to be a temporary measure until the [redacted] service line could be replaced. The [redacted] used this water connection only for bathing, washing dishes and washing clothes.

At the invitation of [redacted], EPA visited the [redacted] home on April 27, 2015, and reviewed the internal plumbing and information provided by [redacted], including water samples and spent filter cartridges. During this visit, EPA observed that the internal pipes, valves and connectors at the [redacted] residence were made of CPVC plastic, approved by NSF for potable drinking water applications, with a few minor metal connectors. A review of the treatment units in the home by EPA found that there was no iron filter in the home as had previously been thought. The only active treatment device in the home was a whole-home sediment filter which utilizes NSF certified Whirlpool WHKF-WHWC cartridge filters for sediment removal and taste/odor. There was also a non-functioning 'Water Resources International Hydro-Quad Commercial Water Processor' which was bypassed (see Appendix A).

At the request of [redacted], Dr. Marc Edwards at Virginia Tech provided sampling instructions to [redacted] for collecting a series of samples from her home. As part of the instructions, on the night of April 27, 2015, the water at the [redacted] residence was turned back on temporarily and the kitchen tap was flushed for 25 minutes at low flow prior to letting the water sit overnight. A series of sequential samples were collected the following morning (April 28, 2015) and sent to Dr. Edwards for analysis.

Dr. Edwards provided [redacted] with the results of the analyses and also shared the results with EPA on May 5, 2015, along with information regarding other chemical parameters tested (see Appendix B). In addition to very high lead levels in all sample results, the analytical data shows a correlation between lead and phosphate as well as lead and aluminum in all samples. On April 24, 2015, EPA had learned that Flint did not have corrosion control treatment in place and also learned that Flint was using ferric chloride as a coagulant. Consequently, as the City of Flint is not utilizing phosphate or alum as treatment chemicals since the source switch, the results indicate that it is likely that the phosphate and aluminum were being released from the scale within the distribution system network. This scale would have formed on the inside of the pipes in Flint during the time when the City was purchasing water from Detroit, as Detroit utilizes orthophosphate for corrosion control and alum as a coagulant in their water filtration process.

Research conducted by EPA on lead content in pipe scales has shown that scales which form on the inside of lead pipes can be released or dislodged into the water and may contain a high percentage of lead (Appendix C). Although the results received from Virginia Tech were indicative of the presence of a lead service line, the FWD indicated that no records existed to confirm whether any portion of the service line connecting to the [redacted] home was made of lead. However, given the high lead levels found, it was presumed that at least a portion of the service line was likely made of lead. In the course of following up on the high lead at the [redacted] home, additional sample results provided to EPA from other residences in Flint also showed high lead levels.

Primarily from a public health standpoint, but also from a research standpoint, it was important to try to find out what the cause of these very high lead levels might be. EPA Region 5, EPA's Office of Research and Development and others have been working

together collaboratively to better understand lead release mechanisms from lead service lines in anticipation of upcoming revisions to the Lead and Copper Rule (LCR) and as part of a collaborative effort in EPA Region 5 to study potential options for optimizing phosphate treatment to control lead in water and the need to reduce phosphorus discharges into the environment. Since the [redacted] service line was scheduled for replacement on May 6, 2015 and the presumption was that at least a portion of the service line was lead, EPA visited the [redacted] home on the day of the service line replacement to gather information and service line pipe samples that could provide additional information as to how lead levels could get as high as they did in this case.

The original service line to the [redacted] home was disconnected and two service line pipe segments from this service line were extracted on May 6, 2015. Additional tap water samples were collected also from two homes on Bryant Street that were connected to the same water main as the [redacted] home (Appendix A). The samples were collected from these homes as they had more typical service line lengths as compared with the [redacted] home. During the same visit, patches of asphalt were also noted along the curb on Browning Avenue, indicating that excavation had occurred. These patches, which were in proximity of the [redacted] service line in the parkway (see Appendix C) may be one of the potential factors contributing to the high lead at the [redacted] home, as it has been shown that physical disturbances to pipes can dislodge the scales within those pipes.

The two service line segments that were extracted were subsequently identified as galvanized iron pipe. Analyses conducted by Virginia Tech on the extracted portions of the pipe indicate that the galvanized iron pipe was fairly typical in terms of composition (see Appendix C). The galvanized iron portion ran from inside the [redacted] home to the external shut-off valve at the corner of [redacted] and Bryant Street. The remainder of the [redacted] original service line from the shut-off valve to the water was made of lead.

Although the service line had been disconnected from the [redacted] home, it was not possible to retrieve a segment of the lead portion of the service line as it was beyond the shut-off valve which had been closed and left in place. Following the disconnection of the original service line, a new service line made of copper was installed from the [redacted] home to the water main in front of the home on [redacted]. Subsequent to the replacement of the service line at the [redacted] home, water samples were also collected from the [redacted] home and sent to the EPA Chicago Regional Laboratory for analysis. In all three homes, the sequential samples were collected using standard protocols used in prior sequential sampling efforts to capture water samples reflecting lead levels from the kitchen tap to the water main. Two additional samples were collected from the water heater drain valve at the [redacted] home to determine if lead deposits had accumulated in the water heater, and a final sample was collected from the bathroom tap. The sequential sampling results indicate that the service line replacement eliminated the high lead levels and that no residual lead had accumulated within the plastic plumbing of the [redacted] residence, which was a potential concern and possibility based on prior research. One of the two samples collected from the [redacted] hot water heater had high lead (32 µg/L), likely from lead particulate that had accumulated in the tank, and the sample collected from the bathroom was 5.5 µg/L.

The sequential samples collected from the two homes on Bryant Street had differing results. At the first home (Site 2), a series of 15 sequential one-liter samples were collected and the results are indicative of a service line that does not contain any portion that is made of lead. Consequently the lead results were low overall for samples representative of the service line. The first sample in the sequential sampling series was the highest, which potentially indicates the presence of leaded brass in the faucet or underlying sink fixtures. Some leaded brasses manufactured prior to the 2011 lead-free law have been shown to release high levels of lead in certain water qualities. Leaded-solder was ruled out as the home plumbing consisted of galvanized iron pipe, and it is presumed that if the galvanized iron pipe were contributing the higher lead, the lead levels would be more consistent in all 15 samples.

At the second home (Site 3), a series of 15 sequential one-liter samples were collected from the kitchen tap and the results indicated that there were no significant sources of lead within the home plumbing but that a portion of the service line is likely made of lead, as indicated by the characteristic peaking of lead levels in the liters capturing water from the service line between the property and the water main, where the portions of many service lines in Flint are made of lead.

All three sets of sequential samples were analyzed for lead, copper, iron, phosphorus and cadmium. In contrast to the samples analyzed by Virginia Tech from the [redacted] home prior to the removal of the original service line, no phosphorus was present in the sequential samples at the [redacted] home following the replacement of the service line. In addition, no phosphorus was detected in the sequential samples from the two homes on Bryant Street. These results indicate that the source of high lead, aluminum and phosphorus in the analyses conducted by Virginia Tech was likely dislodged or disintegrated scale from within the [redacted] original service line.

The sequential sampling results from the [redacted] home before and after service line replacement, as well as the results from the two homes on Bryant Street are included in Appendix B.

Although relative contributions cannot be determined, there are a number of factors that could have contributed to the high lead levels found at the [redacted] home as follows:

1) Corrosiveness of water and lack of mitigating (corrosion control) treatment

The corrosiveness of the water and the absence of mitigative treatment to control lead release are well known factors that can contribute to high lead release.

2) Presence of a lead service line

Lead service lines are the largest source of lead, when present, and can contribute up to 75 percent of the total mass of lead released into the water. The portion of the original service line from the water main to the external shut-off valve at the corner of [redacted] and Bryant Street, estimated to be approximately 25 feet in length, was found to be a lead

pipe. In addition, studies have also shown that the scales within galvanized iron pipe downstream of lead pipe segments can be 'seeded' with lead from the lead portion of the service line. The [redacted] service line was much longer than most typical service lines which would allow accumulation of a greater total mass of scale within the pipe.

3) Physical disturbances

A recent EPA study indicates that physical disturbances in proximity to lead service lines can cause the dislodging of the protective scales from within the service lines. The photograph in Appendix C shows the scale that was dislodged from inside a lead service line during routine maintenance work in another city due to a physical disturbance of the line. The dislodged scale and sediment contained a very high concentration of lead. At the time of the EPA visit to the [redacted] home, there were two patches of new asphalt visible on [redacted] along the parkway where the [redacted] original service line was located, indicating recent excavation and possible recent physical disturbances to the [redacted] service line (Appendix C). These potential disturbances were along the galvanized iron section of the service line and as noted above, research has shown that the presence of lead pipe upstream can 'seed' the galvanized iron pipe downstream with lead, which results in an accumulation of lead-bearing scales within the galvanized pipe downstream of the lead portion of the service line. It is reasonable to assume that these physical disturbances to the galvanized iron portion of the service line could therefore result in the same dislodging of scale and sediment as studies have shown can happen with lead service lines.

The street disturbances on [redacted] occurred after the [redacted] moved into the home along the portion of the service line made of galvanized iron pipe. There were no visible signs of disturbance on Bryant Street where the lead portion of the [redacted] service line was situated (see Appendix C). It is likely, given the extremely high lead levels found and the co-occurrence of aluminum, phosphorus and lead, that the long segment of galvanized iron pipe was seeded with lead over the entire length of the pipe and the physical disturbances and other factors such as the water chemistry resulted in the release of large amounts of the high-lead bearing scale and sediment into the water. Virginia Tech also found nearly perfect correlations between the lead in water and markers for galvanized pipe scales including zinc.

Recommendations

As indicated by the results from the [redacted] home and previous EPA work, the presence of lead pipes over many years has likely resulted in the accumulation of lead in the scales within non-lead pipes downstream of the lead pipe and physical disturbances to the leaded or non-leaded portions of the service lines have the potential to release large amounts of scale and sediment that could pose an immediate and acute health hazard to the residents. Consequently, even with corrosion control treatment in place in the future, physical disturbances will be capable of dislodging the high lead-bearing scale and sediment from non-lead pipes as well as lead pipes, as was the case in the earlier EPA study.

Obtaining information on the lead reservoirs in the scales within the lead and non-leaded portions of intact service lines is essential for determining the potential risk to residents

from lead-bearing scale released as lead lines are replaced as well as the risk that may remain following removal of the lead lines, where the non-leaded portions of service lines are left in place.

As the [redacted] service line was very long compared to the length of most typical service lines, it is important to assess the potential risk posed by the scale reservoirs in more typical lengths of service lines by extracting both the leaded and non-leaded portions of service lines which have not been physically disturbed. The service lines chosen for extraction and analysis should be representative of the materials commonly used downstream of the lead pipe (e.g., galvanized iron, copper, plastic). Extraction/handling procedures should be developed by EPA to ensure that damage to the scales from the excavation, extraction and delivery of the service line segments is minimized. Sequential sampling should also be conducted on a representative group of homes with common plumbing materials (e.g., galvanized iron, copper, plastic) to determine the extent to which the lead from the service line has seeded the interior plumbing in homes.

It is also critically important to develop and incorporate ongoing training and public education on the potential for high lead release from the scales as a result of any future physical disturbances to service lines and mitigative actions that residents can take to lower their exposure risk. The training and educational material should be assessed for clarity, meaningfulness, and accessibility by a group of residents and health experts to ensure the effectiveness of the communications.

At a minimum, immediate training and public education on the potential risks posed by physical disturbances to service lines should be developed by communications experts and provided to residents, community groups, elected officials, health departments, pediatricians and gynecologists, water and non-water utilities (gas, electric, cable, etc.), plumbing organizations and contractors. Residents should be notified of scheduled work by water and non-water utilities and informed of the potential risk of increased lead levels due to these disturbances.

Appendix A – Background Information

National Primary Drinking Water Regulations (NPDWR) Violations – City of Flint

Following the switch to the Flint River, the City of Flint experienced a series of NPDWR violations as follows:
Acute Coliform MCL violation in August 2014
Monthly Coliform MCL violation in August 2014
Monthly Coliform MCL violation in September 2014
Average TTHM MCL violation in December 2014
Average TTHM MCL violation in March 2015
Average TTHM MCL violation in June 2015

Sampling Sites

The map below shows the three homes that were sampled as provides information on the length of the service lines and the plumbing material. Two portions of the original service line were extracted and analyzed and a third portion was collected from the entry point into the home, but not analyzed.

[map redacted because it shows Personally Identifiable Information]

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGIONAL ADMINISTRATOR
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

MEMORANDUM

DATE: November 4, 2015

SUBJECT: Transmittal of Final Report - High Lead at Three Residences in Flint, Michigan

FROM: Tinka G. Hyde
Water Division Director

TO: Jim Sygo
Deputy Director
Michigan Department of Environmental Quality

Howard Croft
Director of Flint Public Works

Enclosed please find for your file a final redacted version of a report prepared by EPA Scientist, Miguel Del Toral, regarding lead in drinking water at three residences in Flint, Michigan. The redactions remove personally identifiable and medical information. This report has been finalized and is also being provided to the National Drinking Water Advisory Council (NDWAC) for discussion during their upcoming meeting on November 17-19, 2015. We understand you saw an earlier version of this document; and note that most of the recommendations in that interim report are already being implemented (e.g., the City of Flint has switched back to Detroit water; filters have been provided to residents; and additional corrosion control treatment will be implemented).

The final report contains important new information indicating that physical disturbances of lead service lines can dislodge the protective coating that prevents lead from leaching into drinking water. The final report recommends notifying residents about the potential risks of increased lead levels in drinking water when work is undertaken that may disturb lead service lines.

cc: Natasha L. Henderson, City of Flint Administrator

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High Lead Levels in Flint, Michigan

The purpose of this report is to present the findings of activities conducted in response to high lead levels in drinking water reported to the United States Environmental Protection Agency Region 5 Office (EPA) by a resident in the City of Flint, Michigan.

Background Information

Prior to April 30, 2014, the City of Flint purchased water from the City of Detroit. On April 30, 2014, the City of Flint switched from utilizing purchased water from Detroit to a new water source, the Flint River. Subsequent to the change in source water, the City of Flint experienced a number of water quality issues resulting in violations of National Primary Drinking Water Regulations (NPDWR) including acute and non-acute Coliform Maximum Contaminant Level (MCL) violations and Total Trihalomethanes (TTHM) MCL violations (see Appendix A).

Beginning in January 2015, [redacted], a resident of Flint, called the Flint Water Department (FWD) regarding the water quality in her home. In response to the initial and subsequent calls, the FWD visited the [redacted] home on a number of occasions and also collected tap water samples. [redacted] also contacted EPA regarding these same water quality issues and medical issues she believes are associated with the water quality in Flint.

Following initial calls on the general water quality, on February 26, 2015, [redacted] contacted EPA regarding high lead levels found in her drinking water by the City of Flint. The result of the initial lead in water sample collected by the City of Flint on February 18, 2015 from the [redacted] home was 104 µg/L and the level of iron in the water exceeded the capability of the instrument to measure (>3.3 mg/L). On February 26, 2015, upon receiving the lead results from [redacted], the EPA contacted the Michigan Department of Environmental Quality (MDEQ) regarding the high lead result. The MDEQ advised that the City of Flint collect a follow-up sample for lead at the [redacted] home.

On March 3, 2015, the City of Flint collected a follow-up sample for lead at the [redacted] residence and the result of this second sample was 397 µg/L.[1] Subsequent to receiving her second result, EPA spoke to [redacted] via phone on March 19, 2015, and the following information was provided by [redacted]:

- The [redacted] home is a HUD home which was gutted and renovated in 2011. All existing plumbing had been removed and the [redacted] installed plastic plumbing.
- Due to high iron levels in the tap water, the [redacted] installed an iron filter downstream of the service line inlet into the home.
- [redacted] indicated that at this time they are not drinking the water or using it for cooking. She stated that her child's blood lead level (BLL) was originally at [redacted] in 2012 and that a more recent test showed it had increased to [redacted], but she noted that

[1] *Note: A third water sample had been collected on April 2, 2015, but the results had not been provided to the [redacted] at the time the interim report was written. The third lead in water sample result was 707 µg/L.*

the BLL testing was done well after the child had stopped drinking the water and may have been higher during the time the child was consuming the water.

- Water samples collected by the City of Flint from her home were collected from the kitchen tap after the iron filter was physically removed.
- The Flint Water Department (FWD) informed [redacted] that her service line does not connect to the water main in front of her home as is typically the case for most homes.
- On March 18, 2015, City of Flint personnel went to the [redacted] home to locate the external shut-off valve in conjunction with the planned replacement of the [redacted] service line and were unsuccessful. Eventually it was discovered that the external shut-off valve was located at the corner of [redacted] and Bryant Street, two houses down from the [redacted] home.

As part of EPA's effort to respond to [redacted] concerns regarding her water results, EPA contacted the FWD. The following information was provided to EPA by the FWD:

- [redacted] home is one of the first homes built on the block and the service line runs for approximately 50-60 yards, connecting to the water main on Bryant Street which runs perpendicular to [redacted] (see Appendix A).
- Flint has a large number of lead service lines, so it would not be surprising to find that this is a very long lead line.
- The first sample from the [redacted] home was collected with the iron filter in place, and the second was with the iron filter physically removed. The iron filter was located just after the water meter.
- [redacted] showed FWD a video of her son 10 minutes after taking a bath, and that he had a full body rash in the video.

It was a common practice in the early 1900s to purchase large parcels of land and later subdivide them. Since service lines are typically run from the water main to the nearest location on a property and it is possible that the [redacted] home may have originally been part of a larger parcel of land that encompassed the two homes that now exist adjacent to the [redacted] home and was subsequently divided, leaving the original home connected to the same service connection and water main, while the newer homes were connected to a more recent water main installed along [redacted].

Based on a suspected conflict of interest at the healthcare facility that originally tested her son's BLL, [redacted] took her son to a different healthcare facility to have his blood lead tested again. On April 1, 2015, [redacted] provided EPA with a copy of her child's blood lead testing performed on March 27, 2015, showing a higher BLL ([redacted]) than the original test.

Due to the persistently high lead results, the FWD shut off the water service to the [redacted] home on April 3, 2015. Per agreement between the FWD and [redacted], her home was then connected to her neighbor's home via a garden hose, from one hose bib to another. This was understood to be a temporary measure until the [redacted] service line could be replaced. The [redacted] used this water connection only for bathing, washing dishes and washing clothes.

At the invitation of [redacted], EPA visited the [redacted] home on April 27, 2015, and reviewed the internal plumbing and information provided by [redacted], including water samples and spent filter cartridges. During this visit, EPA observed that the internal pipes, valves and connectors at the [redacted] residence were made of CPVC plastic, approved by NSF for potable drinking water applications, with a few minor metal connectors. A review of the treatment units in the home by EPA found that there was no iron filter in the home as had previously been thought. The only active treatment device in the home was a whole-home sediment filter which utilizes NSF certified Whirlpool WHKF-WHWC cartridge filters for sediment removal and taste/odor. There was also a non-functioning 'Water Resources International Hydro-Quad Commercial Water Processor' which was bypassed (see Appendix A).

At the request of [redacted], Dr. Marc Edwards at Virginia Tech provided sampling instructions to [redacted] for collecting a series of samples from her home. As part of the instructions, on the night of April 27, 2015, the water at the [redacted] residence was turned back on temporarily and the kitchen tap was flushed for 25 minutes at low flow prior to letting the water sit overnight. A series of sequential samples were collected the following morning (April 28, 2015) and sent to Dr. Edwards for analysis.

Dr. Edwards provided [redacted] with the results of the analyses and also shared the results with EPA on May 5, 2015, along with information regarding other chemical parameters tested (see Appendix B). In addition to very high lead levels in all sample results, the analytical data shows a correlation between lead and phosphate as well as lead and aluminum in all samples. On April 24, 2015, EPA had learned that Flint did not have corrosion control treatment in place and also learned that Flint was using ferric chloride as a coagulant. Consequently, as the City of Flint is not utilizing phosphate or alum as treatment chemicals since the source switch, the results indicate that it is likely that the phosphate and aluminum were being released from the scale within the distribution system network. This scale would have formed on the inside of the pipes in Flint during the time when the City was purchasing water from Detroit, as Detroit utilizes orthophosphate for corrosion control and alum as a coagulant in their water filtration process.

February

Research conducted by EPA on lead content in pipe scales has shown that scales which form on the inside of lead pipes can be released or dislodged into the water and may contain a high percentage of lead (Appendix C). Although the results received from Virginia Tech were indicative of the presence of a lead service line, the FWD indicated that no records existed to confirm whether any portion of the service line connecting to the [redacted] home was made of lead. However, given the high lead levels found, it was presumed that at least a portion of the service line was likely made of lead. In the course of following up on the high lead at the [redacted] home, additional sample results provided to EPA from other residences in Flint also showed high lead levels.

Primarily from a public health standpoint, but also from a research standpoint, it was important to try to find out what the cause of these very high lead levels might be. EPA Region 5, EPA's Office of Research and Development and others have been working

together collaboratively to better understand lead release mechanisms from lead service lines in anticipation of upcoming revisions to the Lead and Copper Rule (LCR) and as part of a collaborative effort in EPA Region 5 to study potential options for optimizing phosphate treatment to control lead in water and the need to reduce phosphorus discharges into the environment. Since the [redacted] service line was scheduled for replacement on May 6, 2015 and the presumption was that at least a portion of the service line was lead, EPA visited the [redacted] home on the day of the service line replacement to gather information and service line pipe samples that could provide additional information as to how lead levels could get as high as they did in this case.

The original service line to the [redacted] home was disconnected and two service line pipe segments from this service line were extracted on May 6, 2015. Additional tap water samples were collected also from two homes on Bryant Street that were connected to the same water main as the [redacted] home (Appendix A). The samples were collected from these homes as they had more typical service line lengths as compared with the [redacted] home. During the same visit, patches of asphalt were also noted along the curb on Browning Avenue, indicating that excavation had occurred. These patches, which were in proximity of the [redacted] service line in the parkway (see Appendix C) may be one of the potential factors contributing to the high lead at the [redacted] home, as it has been shown that physical disturbances to pipes can dislodge the scales within those pipes.

The two service line segments that were extracted were subsequently identified as galvanized iron pipe. Analyses conducted by Virginia Tech on the extracted portions of the pipe indicate that the galvanized iron pipe was fairly typical in terms of composition (see Appendix C). The galvanized iron portion ran from inside the [redacted] home to the external shut-off valve at the corner of [redacted] and Bryant Street. The remainder of the [redacted] original service line from the shut-off valve to the water was made of lead.

Although the service line had been disconnected from the [redacted] home, it was not possible to retrieve a segment of the lead portion of the service line as it was beyond the shut-off valve which had been closed and left in place. Following the disconnection of the original service line, a new service line made of copper was installed from the [redacted] home to the water main in front of the home on [redacted]. Subsequent to the replacement of the service line at the [redacted] home, water samples were also collected from the [redacted] home and sent to the EPA Chicago Regional Laboratory for analysis. In all three homes, the sequential samples were collected using standard protocols used in prior sequential sampling efforts to capture water samples reflecting lead levels from the kitchen tap to the water main. Two additional samples were collected from the water heater drain valve at the [redacted] home to determine if lead deposits had accumulated in the water heater, and a final sample was collected from the bathroom tap. The sequential sampling results indicate that the service line replacement eliminated the high lead levels and that no residual lead had accumulated within the plastic plumbing of the [redacted] residence, which was a potential concern and possibility based on prior research. One of the two samples collected from the [redacted] hot water heater had high lead (32 µg/L), likely from lead particulate that had accumulated in the tank, and the sample collected from the bathroom was 5.5 µg/L.

The sequential samples collected from the two homes on Bryant Street had differing results. At the first home (Site 2), a series of 15 sequential one-liter samples were collected and the results are indicative of a service line that does not contain any portion that is made of lead. Consequently the lead results were low overall for samples representative of the service line. The first sample in the sequential sampling series was the highest, which potentially indicates the presence of leaded brass in the faucet or underlying sink fixtures. Some leaded brasses manufactured prior to the 2011 lead-free law have been shown to release high levels of lead in certain water qualities. Leaded-solder was ruled out as the home plumbing consisted of galvanized iron pipe, and it is presumed that if the galvanized iron pipe were contributing the higher lead, the lead levels would be more consistent in all 15 samples.

At the second home (Site 3), a series of 15 sequential one-liter samples were collected from the kitchen tap and the results indicated that there were no significant sources of lead within the home plumbing but that a portion of the service line is likely made of lead, as indicated by the characteristic peaking of lead levels in the liters capturing water from the service line between the property and the water main, where the portions of many service lines in Flint are made of lead.

All three sets of sequential samples were analyzed for lead, copper, iron, phosphorus and cadmium. In contrast to the samples analyzed by Virginia Tech from the [redacted] home prior to the removal of the original service line, no phosphorus was present in the sequential samples at the [redacted] home following the replacement of the service line. In addition, no phosphorus was detected in the sequential samples from the two homes on Bryant Street. These results indicate that the source of high lead, aluminum and phosphorus in the analyses conducted by Virginia Tech was likely dislodged or disintegrated scale from within the [redacted] original service line.

The sequential sampling results from the [redacted] home before and after service line replacement, as well as the results from the two homes on Bryant Street are included in Appendix B.

Although relative contributions cannot be determined, there are a number of factors that could have contributed to the high lead levels found at the [redacted] home as follows:

1) Corrosiveness of water and lack of mitigating (corrosion control) treatment

The corrosiveness of the water and the absence of mitigative treatment to control lead release are well known factors that can contribute to high lead release.

2) Presence of a lead service line

Lead service lines are the largest source of lead, when present, and can contribute up to 75 percent of the total mass of lead released into the water. The portion of the original service line from the water main to the external shut-off valve at the corner of [redacted] and Bryant Street, estimated to be approximately 25 feet in length, was found to be a lead

pipe. In addition, studies have also shown that the scales within galvanized iron pipe downstream of lead pipe segments can be 'seeded' with lead from the lead portion of the service line. The [redacted] service line was much longer than most typical service lines which would allow accumulation of a greater total mass of scale within the pipe.

3) Physical disturbances

A recent EPA study indicates that physical disturbances in proximity to lead service lines can cause the dislodging of the protective scales from within the service lines. The photograph in Appendix C shows the scale that was dislodged from inside a lead service line during routine maintenance work in another city due to a physical disturbance of the line. The dislodged scale and sediment contained a very high concentration of lead. At the time of the EPA visit to the [redacted] home, there were two patches of new asphalt visible on [redacted] along the parkway where the [redacted] original service line was located, indicating recent excavation and possible recent physical disturbances to the [redacted] service line (Appendix C). These potential disturbances were along the galvanized iron section of the service line and as noted above, research has shown that the presence of lead pipe upstream can 'seed' the galvanized iron pipe downstream with lead, which results in an accumulation of lead-bearing scales within the galvanized pipe downstream of the lead portion of the service line. It is reasonable to assume that these physical disturbances to the galvanized iron portion of the service line could therefore result in the same dislodging of scale and sediment as studies have shown can happen with lead service lines.

The street disturbances on [redacted] occurred after the [redacted] moved into the home along the portion of the service line made of galvanized iron pipe. There were no visible signs of disturbance on Bryant Street where the lead portion of the [redacted] service line was situated (see Appendix C). It is likely, given the extremely high lead levels found and the co-occurrence of aluminum, phosphorus and lead, that the long segment of galvanized iron pipe was seeded with lead over the entire length of the pipe and the physical disturbances and other factors such as the water chemistry resulted in the release of large amounts of the high-lead bearing scale and sediment into the water. Virginia Tech also found nearly perfect correlations between the lead in water and markers for galvanized pipe scales including zinc.

Recommendations

As indicated by the results from the [redacted] home and previous EPA work, the presence of lead pipes over many years has likely resulted in the accumulation of lead in the scales within non-lead pipes downstream of the lead pipe and physical disturbances to the leaded or non-leaded portions of the service lines have the potential to release large amounts of scale and sediment that could pose an immediate and acute health hazard to the residents. Consequently, even with corrosion control treatment in place in the future, physical disturbances will be capable of dislodging the high lead-bearing scale and sediment from non-lead pipes as well as lead pipes, as was the case in the earlier EPA study.

Obtaining information on the lead reservoirs in the scales within the lead and non-leaded portions of intact service lines is essential for determining the potential risk to residents

from lead-bearing scale released as lead lines are replaced as well as the risk that may remain following removal of the lead lines, where the non-leaded portions of service lines are left in place.

As the [redacted] service line was very long compared to the length of most typical service lines, it is important to assess the potential risk posed by the scale reservoirs in more typical lengths of service lines by extracting both the leaded and non-leaded portions of service lines which have not been physically disturbed. The service lines chosen for extraction and analysis should be representative of the materials commonly used downstream of the lead pipe (e.g., galvanized iron, copper, plastic). Extraction/handling procedures should be developed by EPA to ensure that damage to the scales from the excavation, extraction and delivery of the service line segments is minimized. Sequential sampling should also be conducted on a representative group of homes with common plumbing materials (e.g., galvanized iron, copper, plastic) to determine the extent to which the lead from the service line has seeded the interior plumbing in homes.

It is also critically important to develop and incorporate ongoing training and public education on the potential for high lead release from the scales as a result of any future physical disturbances to service lines and mitigative actions that residents can take to lower their exposure risk. The training and educational material should be assessed for clarity, meaningfulness, and accessibility by a group of residents and health experts to ensure the effectiveness of the communications.

At a minimum, immediate training and public education on the potential risks posed by physical disturbances to service lines should be developed by communications experts and provided to residents, community groups, elected officials, health departments, pediatricians and gynecologists, water and non-water utilities (gas, electric, cable, etc.), plumbing organizations and contractors. Residents should be notified of scheduled work by water and non-water utilities and informed of the potential risk of increased lead levels due to these disturbances.

Appendix A – Background Information

National Primary Drinking Water Regulations (NPDWR) Violations – City of Flint

Following the switch to the Flint River, the City of Flint experienced a series of NPDWR violations as follows:
Acute Coliform MCL violation in August 2014
Monthly Coliform MCL violation in August 2014
Monthly Coliform MCL violation in September 2014
Average TTHM MCL violation in December 2014
Average TTHM MCL violation in March 2015
Average TTHM MCL violation in June 2015

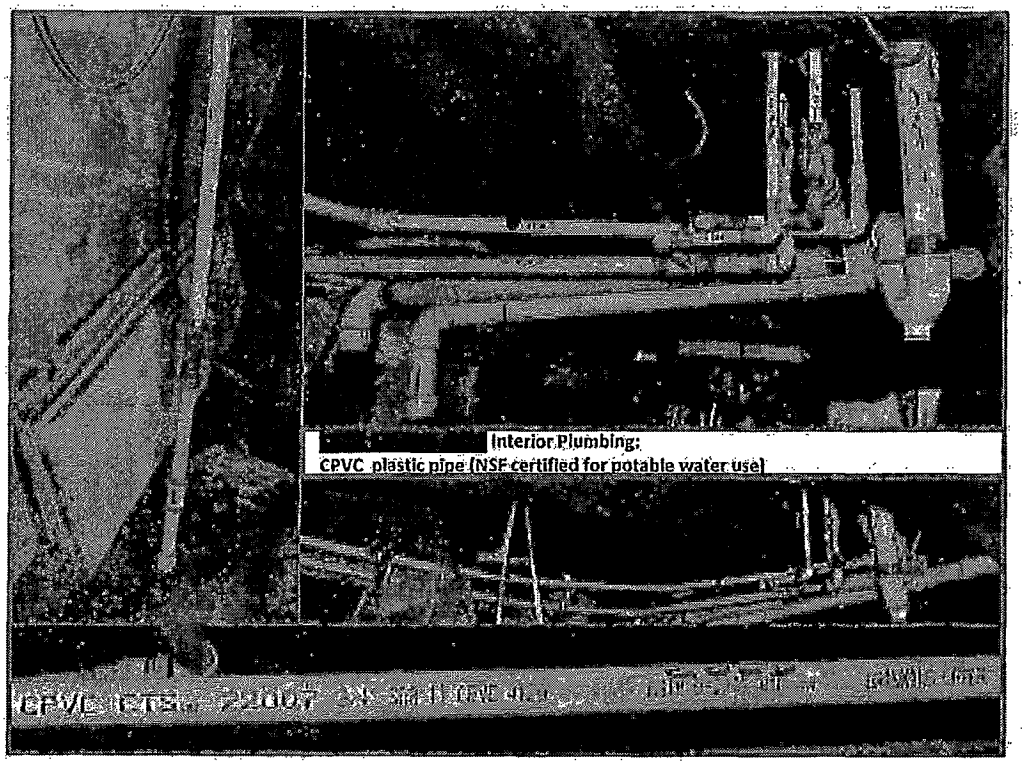
Sampling Sites

The map below shows the three homes that were sampled as provides information on the length of the service lines and the plumbing material. Two portions of the original service line were extracted and analyzed and a third portion was collected from the entry point into the home, but not analyzed.

[map redacted because it shows Personally Identifiable Information]

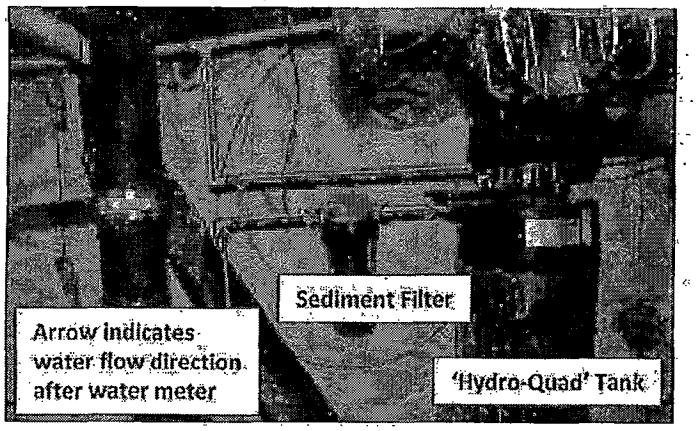
Internal Plumbing – [redacted]

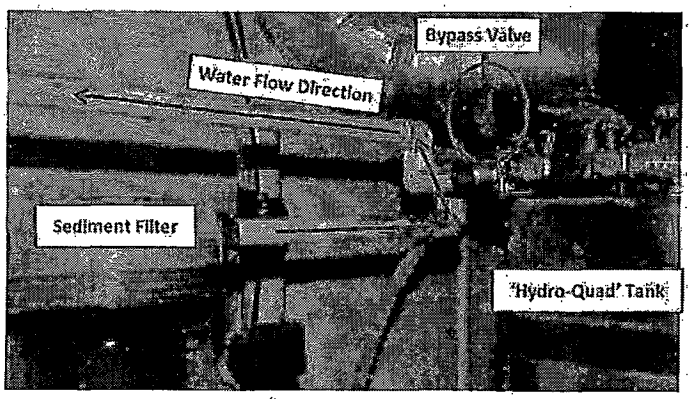
The following pictures were taken at the [redacted] home located at [redacted]. With the exception of a a few minor metallic connectors, all potable water plumbing in the home was found to be CPVC plastic pipe which is NSF-certified for drinking water use.

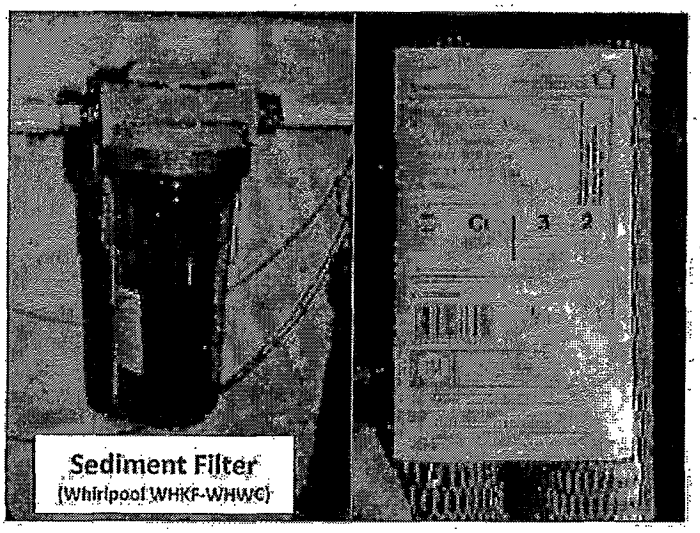


Treatment Units – [redacted]

The [redacted] home has a whole-home sediment filter, as well a non-functioning 'Hydro-Quad Commercial Water Processor' which is bypassed. There was no iron filter in the home as had been previously reported.







Appendix B – Analytical Results

Lead in water sampling results from the [redacted] residence ([redacted])

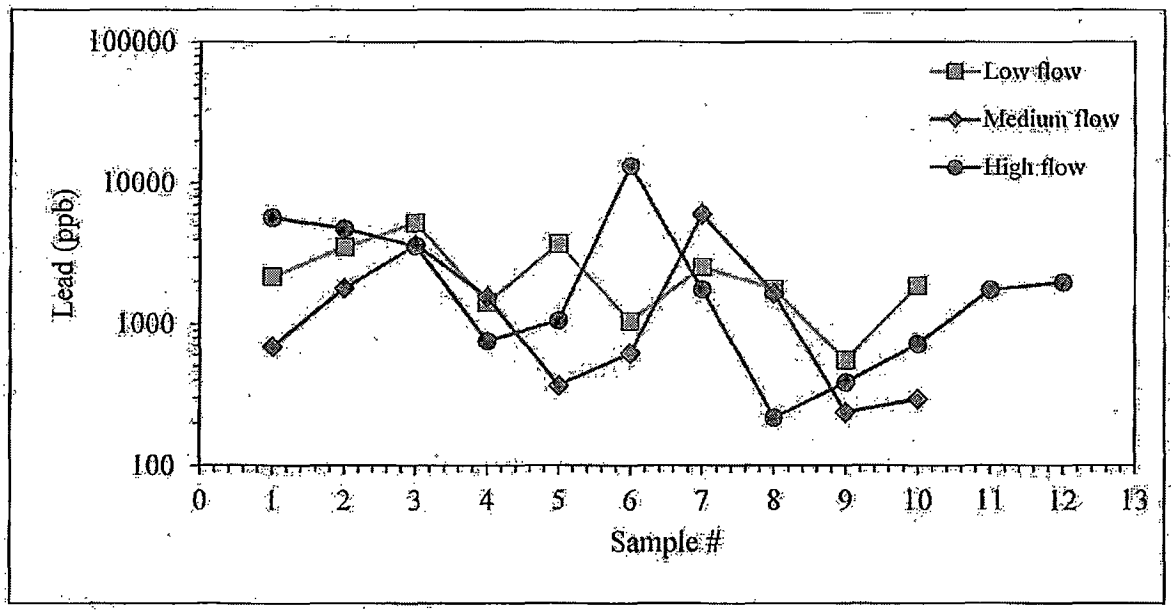
City of Flint Samples

The City of Flint collected water samples from the [redacted] residence and analyzed them for lead. The results for each date are listed below.
February 18, 2015: 104 µg/L
March 3, 2015: 397 µg/L
April 2, 2015: 707 µg/L*

*This sample result had not been provided to the [redacted] at the time the interim report was written.

Virginia Tech Sampling Results (provided courtesy of Virginia Tech)

Samples were collected from the [redacted] home following an extended stagnation period (April 3, 2015 to April 27, 2014) after the water at the [redacted] residence had been shut off. The water was turned back on and three sets of sequential samples were collected on April 28, 2015, at different flow rates (low, medium and high).



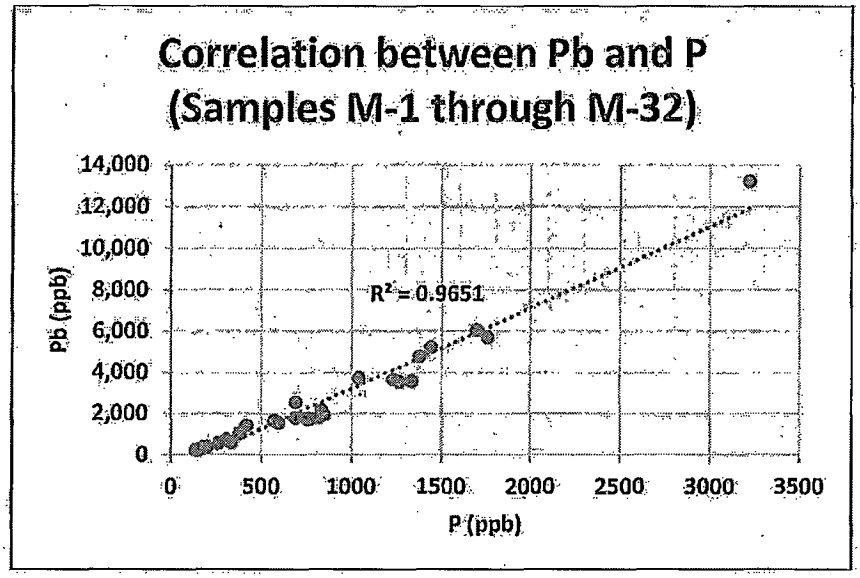
	Low Flow									
	1 L Sample Bottle							125 mL Sample Bottle		
Element (units)	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-21	M-22	M-23
Ag (ppb)	0	0	0	0	0	0	0	0	0	0
Al (ppb)	2,285	4,199	7,683	1,856	5,623	1,422	3,413	1,865	666	2,015
As (ppb)	3.3	3.9	4	2	3.2	2	2.6	3.6	1.9	3.1
Ba (ppb)	31.3	39.8	27.7	21.2	24.2	20.9	22.8	31.3	21.3	32.6
Ca (ppb)	43,150	43,620	43,580	42,590	43,030	42,030	42,440	40,790	41,050	41,460
Cd (ppb)	2.5	4.2	5.7	1.9	3.9	2	2.5	2.2	1.4	2.4
Cl (ppm)	1,206	1,148	1,272	1,178	1,187	1,214	1,218	1,641	1,076	1,044
Co (ppb)	1.1	1.7	0.9	0.4	0.7	0.4	0.5	0.9	0.3	1
Cr (ppb)	2.1	2.5	2.6	1.3	1.9	1.6	1.5	1.8	1.3	1.7
Cu (ppb)	235	355	294	94	146	101	112	180	82	178
Fe (ppb)	3,598	4,928	3,419	1,446	3,029	2,142	1,780	3,096	1,344	3,241
K (ppb)	3,480	3,508	3,445	3,435	3,430	3,391	3,409	3,256	3,319	3,341
Mg (ppb)	10,310	11,910	17,990	11,290	15,470	10,610	12,720	8,861	9,396	9,098
Mn (ppb)	1,734	2,790	1,093	462	703	429	652	1,382	442	1,509
Mo (ppb)	2.3	2.3	1.9	1.9	1.9	1.8	1.8	1.7	1.7	1.8
Na (ppb)	17,790	17,860	17,810	17,620	17,650	17,410	17,610	16,960	17,100	17,280
Ni (ppb)	9.8	16	30.7	8.1	23.2	6.2	15.3	6.6	3.7	6.8
P (ppb)	835	1,267	1,441	416	1,040	379	691	773	261	819
Pb (ppb)	2,171	3,550	5,224	1,412	3,735	1,038	2,542	1,759	552	1,857
S (ppm)	28.5	28.7	28.5	28.4	28.5	28	28	26	27	27.1
Se (ppb)	0.2	0	-0.1	0.1	0.2	0	0.3	0	0	0.2
Si (ppb)	3,212	5,281	12,320	4,474	9,401	3,770	6,231	2,619	2,582	2,775
Sn (ppb)	4.6	4.9	6.1	2.2	4.5	2.3	3	2.3	1.5	2.3
Sr (ppb)	129.4	132.3	128.5	125	127.7	125.3	126.1	126.3	125.5	128
Tl (ppb)	3.4	5.8	8.3	2.1	5.8	1.9	3.1	3	1.4	3.1
U (ppb)	1	1.6	2.6	0.8	1.9	0.7	1.2	0.9	0.4	0.9
V (ppb)	13.9	17.5	23.9	9.8	17.6	8.9	13.8	12.2	6	10.8
Zn (ppb)	1,055	1,848	2,731	777	1,890	839	979	746	513	808

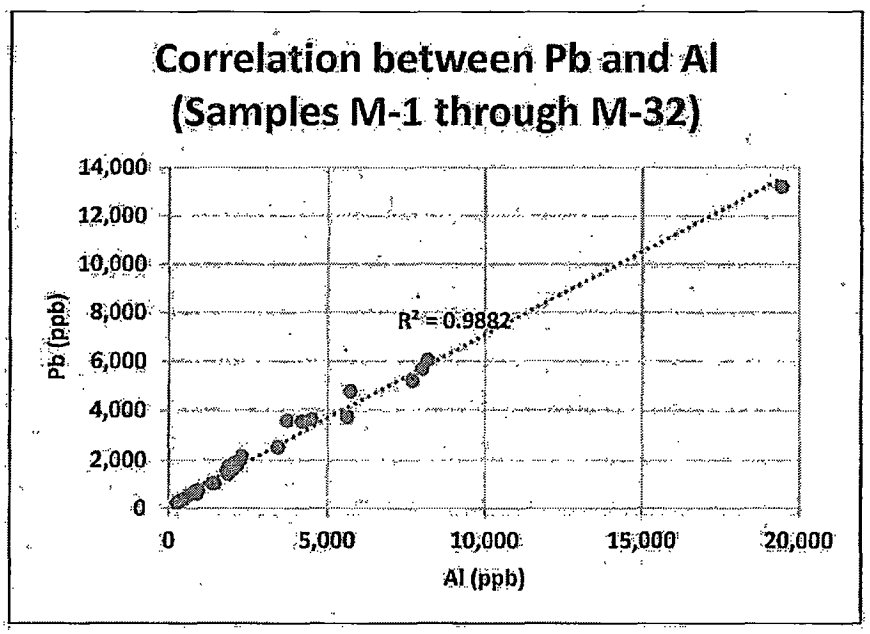
	Medium Flow									
	1 L Sample Bottle							125 mL Sample Bottle		
Element (units)	M-8	M-9	M-10	M-11	M-12	M-13	M-14	M-24	M-25	M-26
Ag (ppb)	0	0	0	0	0	0	0	0	0	0
Al (ppb)	891	2,142	4,493	1,810	431	877	8,159	2,005	286	347
As (ppb)	2.2	2.9	3.9	2.5	2	2.3	4.6	2.7	1.8	2
Ba (ppb)	22	29.1	36.3	28	18.9	22.6	37.1	26.2	18.9	19.4
Ca (ppb)	41,520	41,580	42,080	41,490	41,020	40,850	42,010	40,940	41,110	40,550
Cd (ppb)	1.5	2.4	4	2.1	1	1.5	4.9	2.9	0.9	1
Cl (ppm)	1,329	1,211	1,252	1,225	1,507	1,321	1,324	1,179	1,258	1,318
Co (ppb)	0.4	0.8	1.3	0.7	0.2	0.4	1.4	0.7	0.2	0.2
Cr (ppb)	1.1	1.5	2.2	1.4	1.2	1.1	3.5	2.1	1.1	1.1
Cu (ppb)	104	151	257	144	65	119	267	166	52	59
Fe (ppb)	1,510	2,476	4,254	2,258	912	1,471	4,563	3,450	711	820
K (ppb)	3,363	3,391	3,370	3,352	3,344	3,311	3,360	3,308	3,356	3,311
Mg (ppb)	9,769	9,960	12,360	9,703	9,331	9,513	16,430	10,820	9,237	9,166
Mn (ppb)	498	1,185	1,878	1,052	231	536	1,947	967	167	220
Mo (ppb)	1.8	1.8	1.8	1.9	1.8	1.8	2.2	2	1.7	1.7
Na (ppb)	17,240	17,370	17,370	17,310	17,190	17,010	17,320	17,020	17,140	16,950
Ni (ppb)	4.1	7.7	16.2	6.8	2.7	3.8	33	7.7	2.1	2.4
P (ppb)	321	690	1,233	595	178	332	1,697	573	144	163
Pb (ppb)	688	1,791	3,655	1,549	366	616	6,048	1,631	237	292
S (ppm)	27.6	27.5	27.3	27.3	27.1	26.9	27	26.4	27	26.6
Se (ppb)	0	0	0.2	0.1	0.1	0.2	0.2	0.3	0.1	0
Si (ppb)	2,892	3,591	6,180	3,307	2,445	2,756	11,280	4,184	2,274	2,303
Sn (ppb)	2.2	2.6	4.4	2.5	1.4	1.8	4.9	3	1	1.1
Sr (ppb)	124	128	128	126	124	124	128	126	125	124
Ti (ppb)	1.6	2.9	5.5	2.5	1	1.2	7.7	2.7	0.4	0.6
U (ppb)	0.5	0.9	1.7	0.9	0.4	0.5	2.7	0.9	0.3	0.3
V (ppb)	8.4	11.9	17.5	10.4	8.2	8.4	25.1	9.7	6	7.4
Zn (ppb)	657	933	1,669	836	366	592	1,934	1,304	305	337

	High Flow											
	1 L Sample Bottle						125 mL Sample Bottle					
Element (units)	M-15	M-16	M-17	M-18	M-19	M-20	M-27	M-28	M-29	M-30	M-31	M-32
Ag (ppb)	0	0	0	0	0	0	0	0	0	0	0	0
Al (ppb)	7,984	5,713	3,714	912	1,354	19,440	1,893	248	455	822	1,859	2,176
As (ppb)	5	4.1	4.3	1.9	2.1	7.4	2.9	2	2.2	2.3	3.2	3.4
Ba (ppb)	40	37	45	21	22	41	32	19	20	22	31	34
Ca (ppb)	42,200	41,870	41,760	41,120	41,110	43,860	41,410	40,730	40,990	40,550	41,000	41,050
Cd (ppb)	5.6	4.1	3.7	1.4	1.9	9.3	2.2	0.9	1.2	1.6	2.1	2.5
Cl (ppm)	1,347	1,261	1,088	1,150	1,138	1,285	891	1,261	1,309	1,215	1,121	1,226
Co (ppb)	1.6	1.4	1.7	0.4	0.4	1.9	0.9	0.2	0.3	0.4	0.9	1
Cr (ppb)	2.8	2.4	2.6	1.3	1.3	4.8	1.7	1.1	1.5	1.5	1.6	1.8
Cu (ppb)	541	24	276	89	105	351	165	52	70	96	167	192
Fe (ppb)	4,926	4,288	5,323	1,509	1,705	6,491	3,074	667	1,215	1,591	3,026	3,349
K (ppb)	3,363	3,350	3,343	3,327	3,305	3,410	3,361	3,320	3,348	3,287	3,333	3,331
Mg (ppb)	15,910	13,430	9,758	9,633	10,240	29,890	9,110	9,158	9,305	9,462	9,051	9,157
Mn (ppb)	2,067	2,058	2,818	498	503	1,975	1,401	149	301	534	1,369	1,638
Mo (ppb)	2	2	2	1.9	1.9	2.2	1.8	1.8	1.8	1.8	1.8	1.8
Na (ppb)	17,340	17,310	17,280	17,110	16,980	17,540	17,370	17,040	17,210	16,840	17,250	17,230
Ni (ppb)	30.6	21.7	11.8	4.6	5.8	80	7.5	3	2.8	3.9	6.3	7.2
P (ppb)	1,758	1,378	1,336	308	378	3,224	771	134	199	299	756	847
Pb (ppb)	5,702	4,781	3,585	755	1,055	13,200	1,752	217	384	715	1,742	1,962
S (ppm)	27.2	26.9	26.8	26.7	26.6	27.1	27	26.6	26.9	26.2	26.8	26.4
Se (ppb)	0.2	0.2	0.2	0	0	0.1	0	0.2	0.1	0.2	0.1	0.1
Si (ppb)	10,530	7,660	3,636	2,830	3,573	26,740	2,680	2,258	2,422	2,687	2,661	2,826
Sn (ppb)	5.6	4.2	3.8	1.8	2	8.9	2.2	1	1.3	1.6	2.2	2.5
Sr (ppb)	129	128	129	125	125	131	128	125	125	125	127	127
Ti (ppb)	8.2	6.1	6.2	1.1	2.2	16.9	3.7	0.5	0.8	1.3	3	3.1
U (ppb)	2.7	2	1.6	0.5	0.6	5.6	0.9	0.3	0.4	0.5	0.9	1
V (ppb)	24.3	19.8	16.3	6.8	8.3	51.3	10.2	6.5	7.8	8	10.9	11.7
Zn (ppb)	2,520	1,622	1,305	593	796	3,652	752	293	395	603	739	856

Correlation between lead, phosphorus and aluminum

The correlation of lead and phosphate, as well as lead and aluminum, indicate that the samples were captured scale and sediment that had formed inside the pipes while the City of Flint was purchasing water from Detroit. The absence of these chemicals in the current treatment provided by Flint indicate that these elements were not in the water passing through the pipes, but came from the scales inside the service line which had disintegrated into the water or were dislodged into the water.

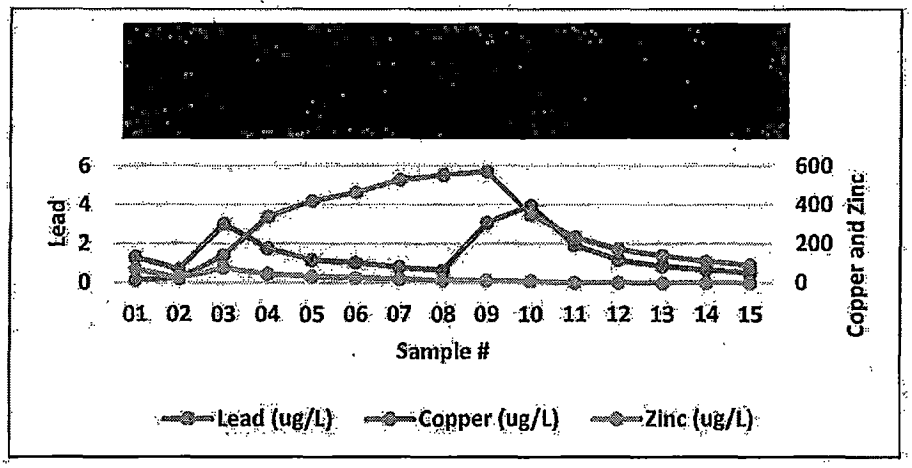




U.S. EPA Region 5 sampling

[redacted] residence (following replacement of service line)

Following the replacement of the [redacted] original service line, a series of 15 sequential samples were collected from the kitchen tap to measure the lead levels and other parameters to ensure that the high lead from the original service line had not contaminated the interior plumbing at the [redacted] home. With the exception of two areas, lead levels were low throughout the [redacted] plumbing following the service line replacement. The two sources of lead that were still detected in the plumbing are likely the water meter (Sample 3) and the new external service shut-off valve (Samples 9-11). Although new brass plumbing components must be lead-free, there can still be some lead that is released from these components.



[redacted] ([redacted] home)

After Service Line Replacement

Sample #	Site Description	Copper (ug/L)	Lead (ug/L)	Zinc (ug/L)	Cadmium (mg/L)	Iron (mg/L)	Phosphorus (mg/L)
01	Kitchen	13.1	1.3	70.9	U	0.171	U
02	Kitchen	20.1	0.687	23.2	U	0.117	U
03	Kitchen	141	3.01	76.8	U	0.144	U
04	Kitchen	336	1.76	45.4	U	0.151	U
05	Kitchen	419	1.17	32.2	U	0.149	U
06	Kitchen	463	1.03	24.8	U	0.149	U
07	Kitchen	529	0.8	19.6	U	0.146	U
08	Kitchen	554	0.666	14.9	U	0.147	U
09	Kitchen	571	3.07	11.6	U	0.195	U
10	Kitchen	345	3.93	10.3	U	0.282	U
11	Kitchen	233	1.94	0	U	0.283	U

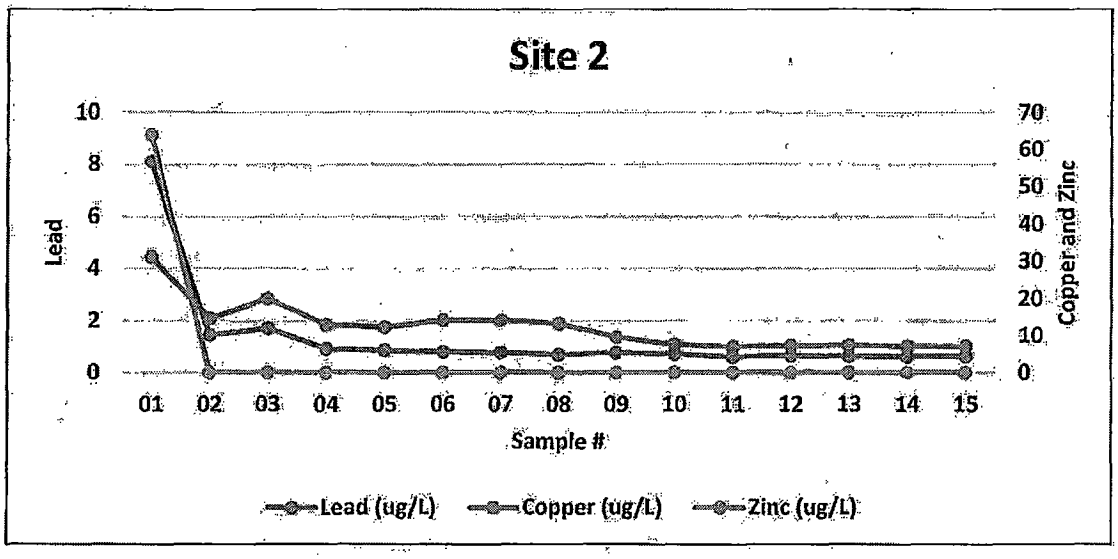
[redacted]: ([redacted] home)

After Service Line Replacement

Sample #	Site Description	Copper (ug/L)	Lead (ug/L)	Zinc (ug/L)	Cadmium (mg/L)	Iron (mg/L)	Phosphorus (mg/L)
12	Kitchen	171	1.17	0	U	0.290	U
13	Kitchen	139	0.864	0	U	0.292	U
14	Kitchen	110	0.67	0	U	0.294	U
15	Kitchen	91.5	0.505	0	U	0.297	U
16	Bathroom	29.7	5.52	71.3	U	0.259	U
17	Water Heater	70.4	31.7	883	U	0.540	0.0877
18	Water Heater	35	9.74	346	U	0.0870	U

Site #2 (Bryant Street)

Based on the results found at this home, it does not appear that any portion of the service line is made of lead, and as a result, the lead levels are low in most samples. The exception is in Sample 1 which reflects water within approximately 15 feet of the kitchen tap and is likely due to brass components in the faucet, underlying valves and fixtures.



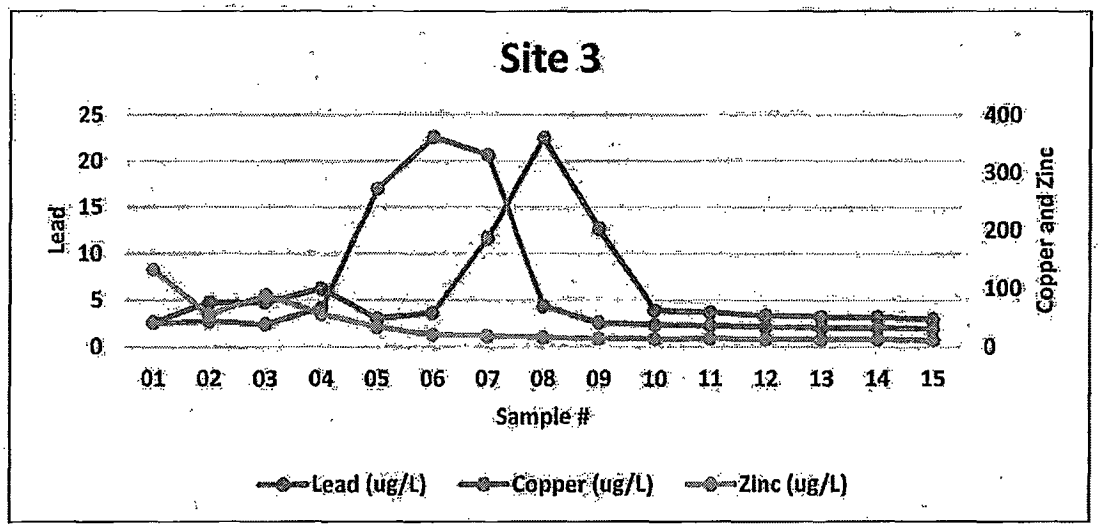
Site 2

(Note: U for Zinc replaced with 0 to show on graph)

Sample #	Copper (ug/L)	Lead (ug/L)	Zinc (ug/L)	Cadmium (mg/L)	Iron (mg/L)	Phosphorus (mg/L)
01	31.1	8.11	64	U	0.0307	U
02	14.7	1.46	U	U	0.0302	U
03	20	1.72	U	U	0.0302	U
04	13	0.933	U	U	0.0301	U
05	12.3	0.862	U	U	0.0311	U
06	14.2	0.795	U	U	0.0298	U
07	14.2	0.769	U	U	0.0311	U
08	13.3	0.691	U	U	0.0317	U
09	9.6	0.774	U	U	0.0319	U
10	7.57	0.715	U	U	0.0313	U
11	7.04	0.611	U	U	0.0301	U
12	7.3	0.655	U	U	0.0336	U
13	7.37	0.644	U	U	0.0308	U
14	7.09	0.631	U	U	0.0313	U
15	7.05	0.621	U	U	0.0300	U

Site #3 (Bryant Street)

Based on the results found at this home, it appears that the portion of the service line from the external service shut-off valve to the water main is made of lead as indicated by the increase in lead levels in samples 7 through 9.



Site 3

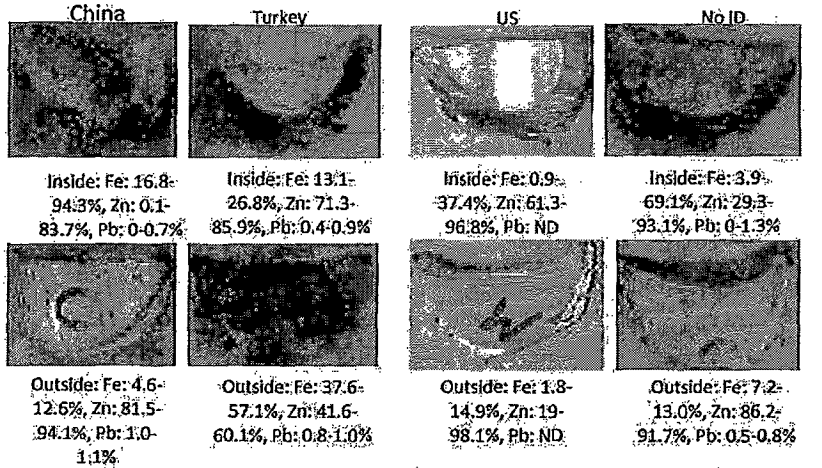
Sample #	Copper (ug/L)	Lead (ug/L)	Zinc (ug/L)	Cadmium (mg/L)	Iron (mg/L)	Phosphorus (mg/L)
01	40.7	2.63	132	U	0.0622	U
02	44.4	4.77	55.3	U	0.249	U
03	39.3	4.79	88.8	U	0.179	U
04	66.8	6.26	57.2	U	0.346	U
05	272	3.07	34.2	U	0.105	U
06	362	3.7	21.4	U	0.0598	U
07	331	11.7	19.5	U	0.0512	U
08	69.9	22.5	16.6	U	0.0399	U
09	42.5	12.7	15.1	U	0.0480	U
10	38.4	3.94	14.4	U	0.0489	U
11	37.5	3.72	14.5	U	0.0492	U
12	34.8	3.39	13.6	U	0.0481	U
13	33.1	3.23	13.1	U	0.0484	U
14	32.8	3.2	13	U	0.0480	U
15	31.4	3	12.3	U	0.0490	U

Analysis of [redacted] original service line pipe (galvanized iron portions)

Lead can also be found in galvanized pipe coatings as a contaminant in the zinc that is used to coat the surface of iron pipe in the galvanizing process. As such, two sections of the [redacted] original service line were analyzed for lead content.

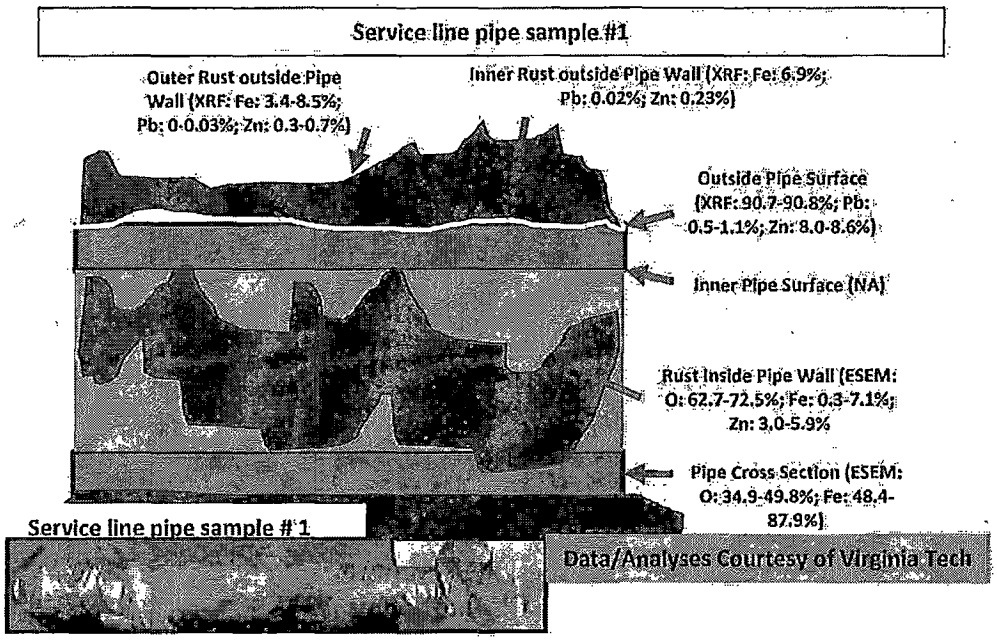
The images and data presented below are for a typical range of galvanized iron pipe.

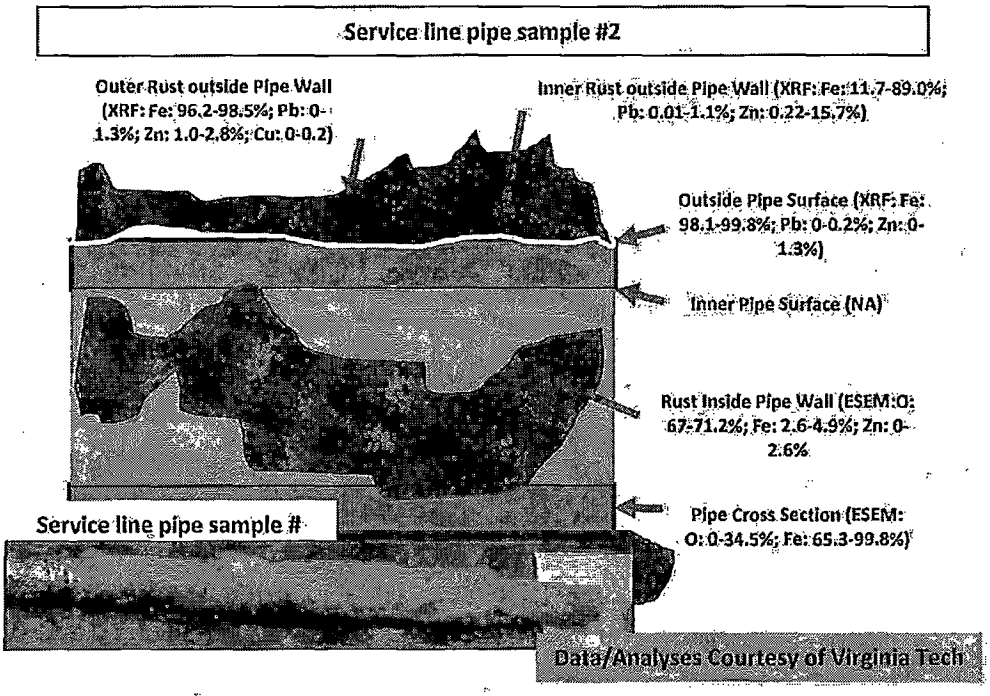
Lead Content of Galvanized Iron Pipe - Examples



Data/Analyses Courtesy of Virginia Tech

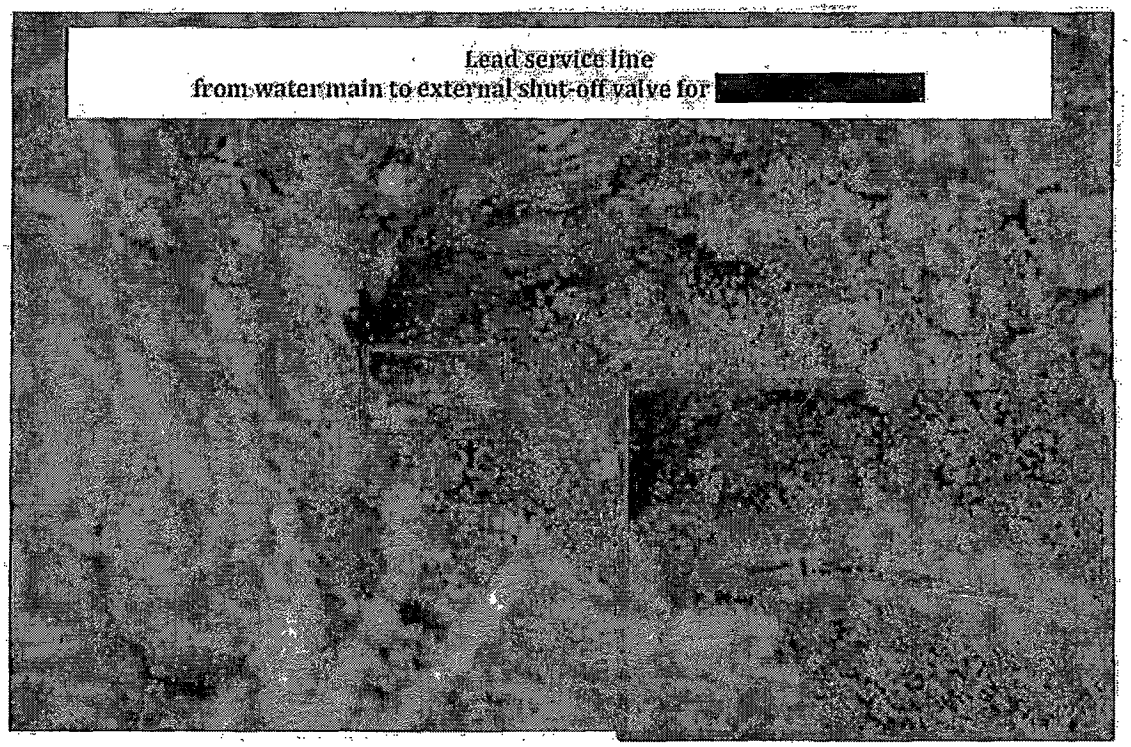
Below are the results of the galvanized pipe analyses conducted by Virginia Tech on the two sections of galvanized iron pipe from the [redacted] original service line. The analyses indicate that the [redacted] original service line was a typical galvanized iron pipe.





Lead portion of the [redacted] original service line

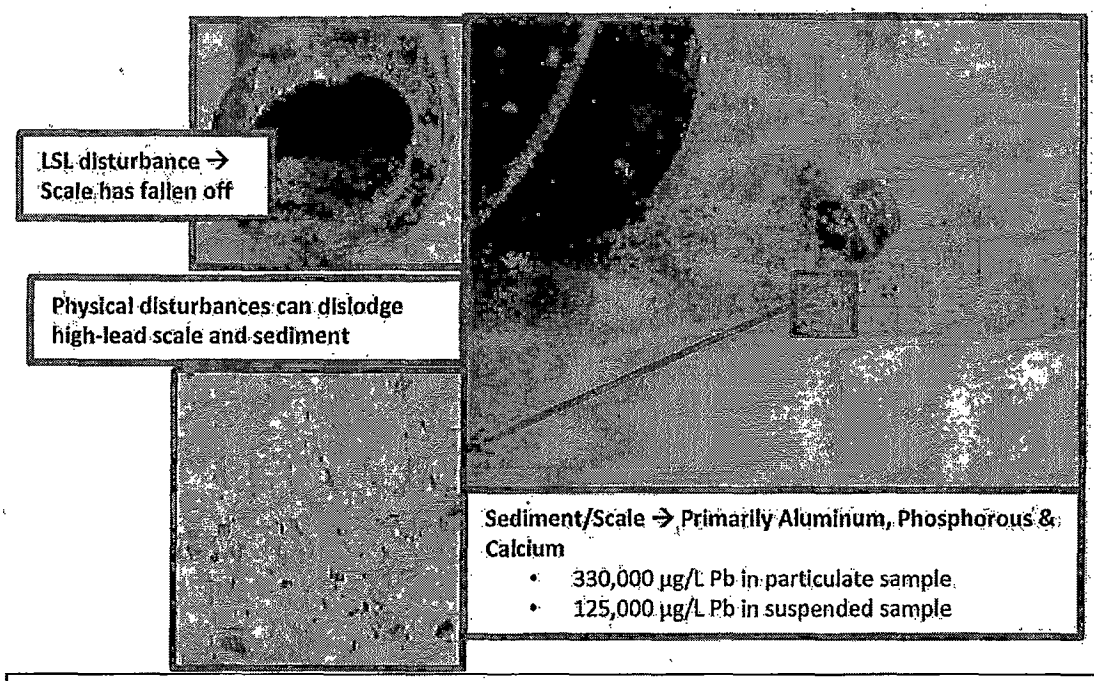
Lead service lines can contribute up to 75 percent of the total mass release into the water. The portion of the [redacted] original service line from the water main to the external shut-off valve at the corner of [redacted] and Bryant Street is made of lead and is estimated to be approximately 25 feet in length.



Appendix C – Additional Information

Physical disturbance of lead service lines

A recent EPA study indicates that physical disturbances to lead service lines or in proximity to lead service lines can cause the dislodging of the protective scales from within the lines. The photograph below shows the scale that was dislodged from inside a lead service line during routine maintenance work in another city due to a physical disturbance of the line. The dislodged scale and sediment contained a very high concentration of lead.



Lead service line disturbances were found to be a common factor for the majority of sites with high lead levels. It is also possible that low water usage may play a role in sites with the highest lead levels.

Lead service line scale analyses conducted by EPA's Office of Research and Development or obtained from peer-reviewed published literature from cities across the U.S. and in Canada (summarized below) show that scales within lead service lines can contain very high concentrations of lead. The yellow highlighted column in the table below shows the percentage of lead that has been found within different scales inside of lead service lines.

Lead & Element Percentages in Important Corrosion Byproduct Solids							
Mineral Name	Formula	% Pb	%C	%O	%S	% P	%Cl
litharge, massicot	PbO	97.80	0.00	7.20	0.00	0.00	
plattnerite, scrutinyite	PbO_2	86.60	0.00	13.40	0.00	0.00	
Cerussite	$PbCO_3$	77.50	4.50	18.00	0.00	0.00	
Hydrocerussite	$Pb_3(CO_3)_2(OH)_2$	80.10	3.10	16.50	0.00	0.00	0.00
Plumbonacrite	$Pb_{10}(CO_3)_6(OH)_6O$	81.30	2.80	15.70	0.00	0.00	0.00
Anglesite	$PbSO_4$	68.30	0.00	21.10	10.60	0.00	0.00

Lead & Element Percentages in Important Corrosion Byproduct Solids							
Mineral Name	Formula	% Pb	%C	%O	%S	% P	%Cl
Leadhillite, Susannite, MacPhersonite	$Pb_4(SO_4)(CO_3)_2(OH)_2$	76.80	2.20	17.80	3.00	0.00	0.00
Hydroxypyromorphite	$Pb_5(PO_4)_3OH$	77.43	0.00	15.55	0.00	6.95	0.00
Chloropyromorphite	$Pb_5(PO_4)_3Cl$	76.38	0.00	14.15	0.00	6.85	2.61
Tertiary Lead Orthophosphate	$Pb_3(PO_4)_2$	76.60	0.00	15.80	0.00	7.60	0.00
Lead(II) orthophosphate	$Pb_9(PO_4)_6$	76.60	0.00	15.80	0.00	7.60	0.00

While visiting the [redacted] home, two fresh patches of asphalt were seen along the parkway where the [redacted] original service line was located. The jarring and vibration associated with excavation can dislodge the high lead-bearing scales from within the service line pipes.



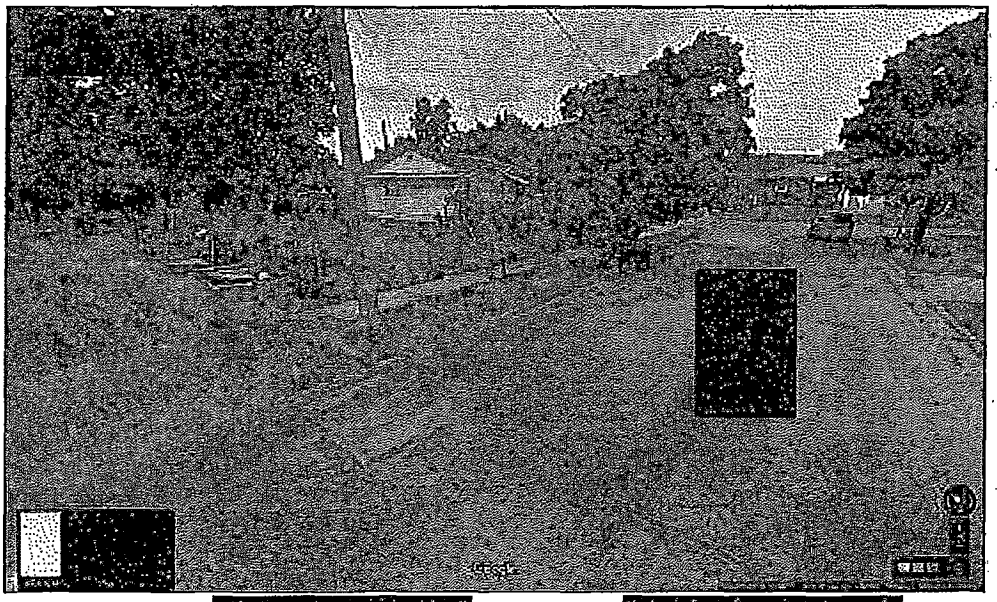
Recent patch (#1) of asphalt along curb next to the parkway where the [redacted] service line runs.

Photograph taken by U.S. EPA on April 27, 2015



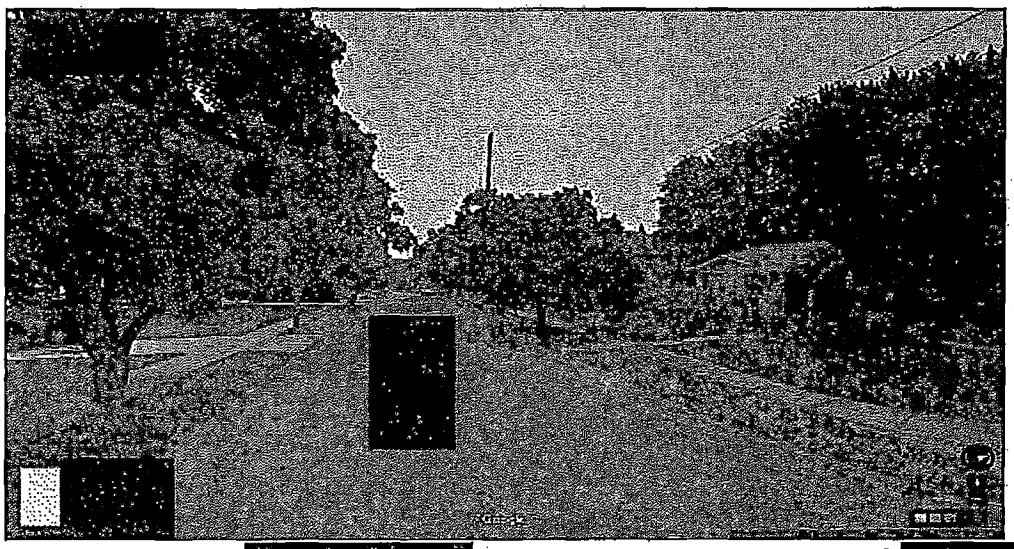
Recent patch (#2) of asphalt along curb next to the parkway where the [redacted] service line runs.

Photograph taken by U.S. EPA on April 27, 2015



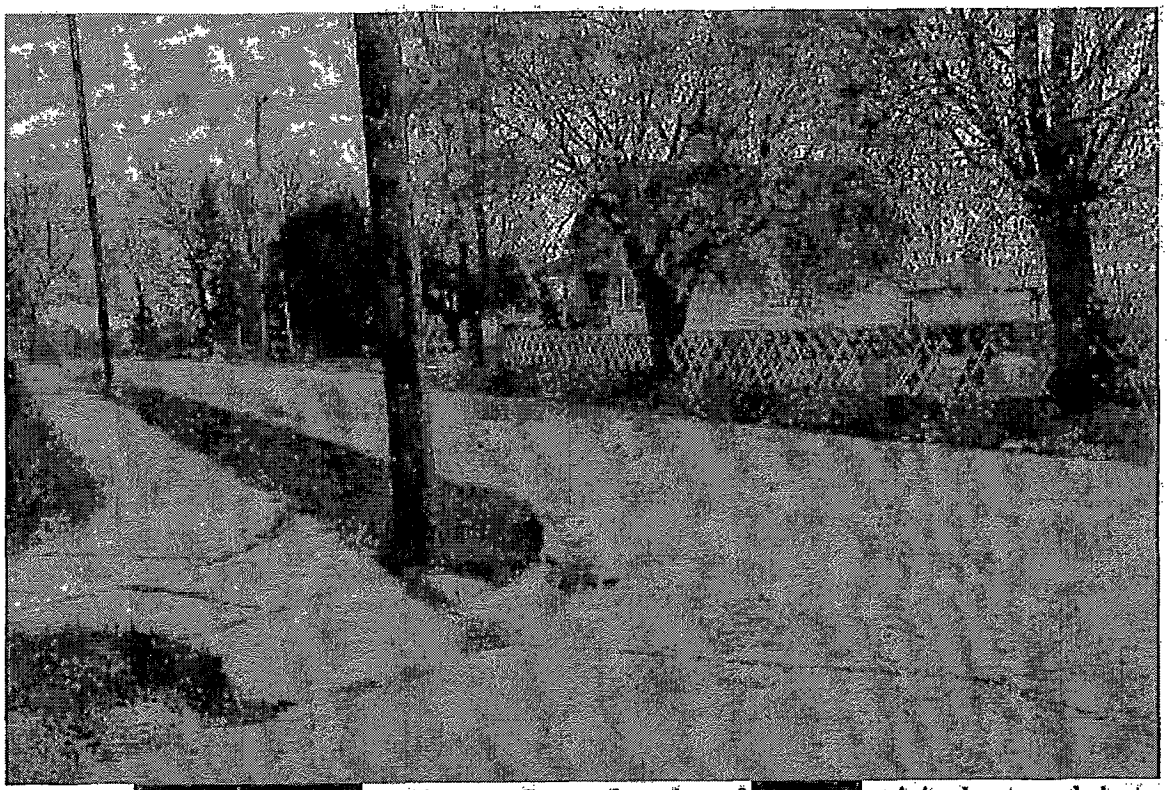
July 2011 image [redacted] (view from [redacted] toward Bryant Street).

Google 'Street View' Image 1 captured in July 2011 shows no patches in street along curb next to the parkway where the [redacted] service line runs toward Bryant Street, indicating that the physical disturbances occurred after the date this image was captured (July 2011).



July 2011 image of [redacted] (view from Bryant Street toward [redacted]).

Google 'Street View' Image 2 captured in July 2011 shows no patches in street along curb next to the parkway where the [redacted] service line runs toward Bryant Street, indicating that the physical disturbances occurred after the date this image was captured (July 2011).



Corner of [redacted] and Bryant Street (location of [redacted] original external shut-off valve).
Photograph taken by EPA on April 27, 2015 shows no visible signs of physical disturbances in the vicinity of the lead portion of the [redacted] service line from the external shut-off valve to the water main on Bryant Street.

The Honorable Daniel Kildee
Member, U.S. House of Representatives
Washington, DC 20515-1313

Dear Congressman Kildee:

Thank you for your September 9, 2015 letter regarding drinking water quality in Flint and the June 24, 2015 U. S. Environmental Protection Agency memorandum from Miguel A. Del Toral to Thomas Poy. EPA shares your concern about the quality of the drinking water in Flint. Our focus has been to work with the Michigan Department of Environmental Quality (MDEQ) and the City of Flint so they can provide clean and safe water to its residents.

Mr. Del Toral's June 24, 2015 internal memo summarizing the activities conducted in response to a Flint resident's request for help with high lead levels and expressing his concerns about Flint's drinking water was sent to Mr. Poy. Mr. Del Toral's statements in the memorandum regarding concerns about lead levels in Flint are his professional judgments based on the facts that Flint has not provided corrosion control treatment after switching source waters and that EPA sample results from some homes in Flint found high levels of lead. In addition, the last two rounds of compliance monitoring conducted by Flint, while below the lead action level of 15 micrograms per liter (ug/L), had lead concentrations trending higher.

The lead compliance goal under the Lead and Copper Rule (LCR) is to not exceed the lead action level of 15 ug/L in at least 90% of the samples taken. This is determined by comparing the 90th percentile concentration (e.g., the 90th highest value out of 100 results) to the lead action level. The last two rounds of compliance monitoring that the MDEQ had Flint conduct had the 90th percentile concentrations below the lead action level. The round of samples taken from July 2014 to December 2014 had a 90th percentile value of 6 ug/L. The last round of samples taken from January 2015 to June 2015 had a 90th percentile value of 11 ug/L. Public notice is provided when the action level is exceeded.

Even if public notice is not required, the LCR requires that homeowners whose water was sampled for lead by the water system receive a copy of their individual lead results, including an explanation of health effects and steps the consumer can take to reduce lead exposure from drinking water. EPA and the Centers for Disease Control and Prevention believe there is no safe level of lead exposure. Lead is harmful to health, especially for children. While paint, dust, and soil are the most common sources of lead, drinking water can contribute 20 to 40 percent of an

infant's lead exposure. Lead is typically not found in a utility's source water. It comes from pipes and fixtures, some of which is the owned by the homeowner. Therefore, it is difficult to say with certainty what the lead levels are in each home. The goal is to remove as much lead from drinking water as possible.

EPA promotes a number of options to reduce the amount of lead in the drinking water.

- Have your water tested. The water system will test drinking water for residents upon request.
- Be aware of any work that could disturb your lead service line, such as water main replacement, lead service line repair or replacement of part of the service line.
- Run water before use if it has not been used for several hours. The amount of time to run the water will depend on whether the home has a lead service line or not.
- Use only cold water for drinking, cooking, and preparing baby formula.
- Purchase a water filter that is certified to remove "total lead."
- On a regular basis clean and remove any debris from faucet aerators to clear out any particles of lead that may become trapped in the aerator.
- Purchase lead-free faucets and plumbing components.
- Remove the entire lead service line.

The compliance monitoring conducted by Flint also shows that they do not have optimized corrosion control and they should implement treatment as soon as possible. To help with the implementation of corrosion control treatment, EPA has offered and Flint has accepted technical assistance from EPA's Office of Research and Development experts on lead and water distribution systems to compliment the expertise of MDEQ field staff.

In addition to assisting on needed treatment for Flint's water system, EPA is currently evaluating Flint's compliance with the LCR. We are working with our legal counsel to confirm our interpretation of the LCR regulations regarding maintaining optimum corrosion control treatment. Also, EPA is reviewing the latest round of lead compliance monitoring conducted by Flint to see if all of the relevant samples have been included in the 90th percentile compliance calculation. We will provide you with the results of our evaluation when it is completed.

Again, thank you for your letter. If you have further questions, please contact me, or your staff may contact Denise Fortin, the Region 5 Congressional Liaison, at (312) 886-3000.

Sincerely,

Susan Hedman
Regional Administrator

DRAFT

cc: Catherine Davis – OCIR-CA-WPTT
Office of Water

RF

Issue: Flint Drinking Water Issues

Background/Status: Flint has been having issues since changing the source of their drinking water – from purchasing finished water from Detroit (which comes from Lake Huron) to treating Flint River water themselves at the end of April 2014. The quality of the water in the Flint River is different than that from Lake Huron, and requires additional treatment to ensure an acceptable quality drinking water. The Michigan Department of Environmental Quality (MDEQ) has been working closely with the Operator-in-Charge at Flint's Water Treatment plant to ensure that the citizens of Flint are provided drinking water that meets health standards. The use of Flint River water is an interim decision as Flint plans to connect to the Karegnondi pipeline, which will draw water from Lake Huron, in 2016.

Flint exceeded the health standard for *E. coli* in August 2014 and total coliform in September 2014 due to issues with malfunctioning valves in the distribution system creating stagnated water flow in certain areas. Additional chlorine was added to deal with the bacteria problem and these two violations have returned to compliance. However, the additional chlorine has likely contributed to a Disinfection Byproduct violation – Total Trihalomethane (TTHM) - in the fourth quarter of 2014. Compliance with the TTHM health standard is based upon the average of one year of quarterly sample data. The initial monitoring in summer 2014 reported elevated levels of TTHM compounds throughout the City's distribution system. MDEQ staff has worked with Flint to implement operational techniques to reduce TTHM levels. Current levels are below the MCL but consumers will continue to receive public notice of a violation until the running annual average gets below the MCL.

In addition to the MCL violations, there have been other potential issues that have been attributed to the water including, complaints about rashes when using the water to bathe, one home has very high lead in the drinking water (R5 is working with Flint and the homeowner; not sure if this is system-wide issue), and the Genesee County Health Department is looking into an increase in the number of reported cases of Legionaire's Disease in the county in 2014 (still in the investigative stage by the Health Dept – not public knowledge yet). Flint has hired a consultant to help with their drinking water utility. Also, a technical advisory committee has been formed, including Dr. Michael Wright, an EPA-ORD toxicologist, who is providing assistance on health effects.

Flint has a number of DW-SRF loans outstanding. The State recently restructured their loans to allow Flint to defer 2015 payments to future years. Rep. Dan Kildee has been inquiring to EPA on whether principal forgiveness can be applied retroactively to existing loans. EPA is working on a response.

Message:

- Flint switched from purchasing treated Lake Huron water from Detroit to treating Flint River water themselves until a pipeline being constructed can provide them with raw Lake Huron water to treat in 2016.
- Flint has/had MCL violations and has been working with MDEQ staff, a consultant, and a technical advisory committee to improve operations.

Contact: Tom Poy, Water Division, (312) 886-5991, poy.thomas@epa.gov

City of Flint Drinking Water

Outline prepared by the

Michigan Department of Environmental Quality for the

Flint Water Task Force

I. Introduction

This document is intended to provide an overview of Michigan's implementation of the Safe Drinking Water Act with respect to events in the City of Flint.

II. Background

1. How has Flint historically obtained its drinking water?

The water system in Flint, Michigan, was organized and built under private ownership in 1883 as the Flint Water Works Company to pump raw water from the Flint River to their consumers. In 1903, the system was converted to a municipally owned corporation which supplied drinking water to the City until 1967, when the City switched and become a customer of the Detroit Water and Sewerage Department (DWSD) system. After the switch to DWSD, the city of Flint operated their water treatment plant as a standby, backup emergency plant for purposes of reliability in the event that the single pipeline from DWSD was out of service for any reason.

In 2009, the water treatment plant was operated in this emergency capacity in two instances (dates/number of days). As a backup emergency plant, the city was required to operate the plant quarterly to demonstrate the ability to produce safe water in accordance with Michigan's Safe Drinking Water Act (1976 PA 399) and to keep mechanical equipment in good working order, such as valves, rubber seals, etc. Each time the plant was test run quarterly, samples were taken of raw water quality (describe here) and of finished water (post-filters). Treated water was not put into the distribution system during these test runs, but rather was discharged to the river in accordance with a NPDES Permit (confirm with Steve). The test runs were for demonstration purposes only and to keep the plant operational and staff familiar with operation in the event it was needed in an emergency.

2. What State and Federal laws or rules must be complied with in order to ensure safe drinking water is provided to Flint residents?

The federal Safe Drinking Water Act (SDWA) is the primary law that ensures the quality of Americans' drinking water. Under the SDWA, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.

The federal SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. (SDWA does not regulate private wells which serve fewer than 25 individuals.)

The federal SDWA authorizes the United States Environmental Protection Agency (US EPA) to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. US EPA, states, and water systems then work together to make sure that these standards are met.

Originally, the SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

The most direct oversight of water systems is conducted by state drinking water programs. States can apply to US EPA for "primacy," the authority to implement SDWA within their jurisdictions, if they can show that they will adopt standards at least as stringent as US EPA's and make sure water systems meet these standards. Michigan adopted the Safe Drinking Water Act in 1976 and maintained primacy for the program since 1978?

3. **What is EPA's role as a regulatory agency in implementing the SDWA?**

Federal and state governments share responsibility for administering drinking water programs. Under the Safe Drinking Water Act (SDWA), the U.S. Environmental Protection Agency (US EPA) is given the responsibility for developing national standards and regulations that apply to the nation's public drinking water systems and enforcing those standards.

Michigan's drinking water program is reviewed annually by U.S. EPA.

4. **What is DEQ role's as a regulatory agency in implementing the SDWA?**

SDWA also allows states to accept oversight of the drinking water program under an agreement with US EPA giving states primary enforcement (or primacy) responsibilities. In addition to this delegation of federal authority to the states, states also have the power to create additional regulations and programs governing drinking water suppliers through their own legislative and regulatory processes.

The DEQ has primary enforcement authority in Michigan for the Safe Drinking Water Act under the legislative authority of the Michigan Safe Drinking Water Act (Act 399). As such, the division has regulatory oversight for all public water supplies, including approximately 1,425 community water supplies and 10,000 noncommunity water supplies.

The State of Michigan DEQ engages in a variety of activities to help water systems remain in, or return to, compliance. These activities include: visiting water systems and reviewing their facilities, equipment, and operations; requiring the submission of plans and specifications for waterworks system improvements and issuing construction permits; providing for the examination, certification and regulation of persons operating water supplies; helping systems invest in preventive measures; providing financial assistance for system improvements; and conducting training sessions.

5. What is Flint's role in implementing the SDWA?

These federal and state programs are separate from the activities performed by water systems. State and federal programs develop regulations and perform oversight and compliance activities, but do not actually treat or deliver water to customers. At the local level, public and private water utilities collect, treat, and deliver drinking water to consumers.

To ensure that drinking water is safe, SDWA sets up multiple barriers against pollution. These barriers include: source water protection, treatment, distribution system integrity, and public information. As a public water system, the city of Flint is responsible for ensuring that contaminants in tap water do not exceed the standards. The City treats the water, and must test their water frequently for specified contaminants and report the results to the State. If a water system is not meeting these standards, it is the water supplier's responsibility to notify its customers.

The SDWA recognizes that since everyone drinks water, everyone has the right to know what's in it and where it comes from. The City of Flint, like all water suppliers, must notify consumers quickly when there is a serious problem with water quality. Water systems serving the same people year-round must provide annual consumer confidence reports on the source and quality of their tap water.

The city of Flint submits samples of their water for laboratory testing (monitoring) to verify that the water they provide to its residents meets all federal and state standards. How often and where samples are taken varies from system to system and contaminant to contaminant. The State provides an annual monitoring schedule to the City setting forth these requirements.

In addition, the city of Flint is required to maintain on staff, certified water operators that are trained and experienced to operate the treatment and distribution system associated with the city's water system.

III. The Flint River – it is a safe source of drinking water?

In Michigan, we are blessed with high quality drinking water sources. Seventy percent of Michigan's population receives its drinking water from surface water sources, most with intakes in the Great Lakes. A handful of public water supplies in Michigan do treat water from inland sources such as rivers or groundwater under the influence of surface water. While river sources present a greater challenge for

[Our impression is that the average citizen is under the impression that the river water is corrosive and contains lead – we can address no lead, chloride, and lime issues. Address treatment issues to show that water leaving the plant meet all SDWA

requirements. Ph was same as DWSD. Also sets up point that problems arose after water left plant and was disseminated throughout system]

IV. E. Coli and Total Coliform bacteria violations

1. What caused the E.Coli and Total Coliform bacteria violations experienced by Flint in August-September 2014?

A number of factors, not one specific cause, likely contributed to the Boil Water Advisories (BWA's) in the City of Flint during August and September 2014. While use of the Flint River increased the amount of natural organic matter in the City's water, the City's water treatment plant (WTP) performed well above treatment requirements for organic carbon removal. In addition, less than 20% of the water system was included in the advisory area. If treatment had been compromised, detections would have been widespread throughout the City, rather than in such a localized area.

The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of cast iron piping. Cast iron pipe is subject to internal corrosion, called tuberculation, which causes buildup on the pipe interior leading to water quality issues, reduced flow and pressures, and leakage. Tuberculation also encourages the development of biofilms, layers of bacteria that attach to the interior pipe wall. Biofilm growth is common in areas of piping with little or no disinfectant residual, and together with tuberculation can clog water lines to the point of insufficient water pressure.

The City has also experienced decades of a declining user base and water use associated with vacant homes, commercial businesses and industrial property. Declining water use leads to excess residence time within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and disinfectant residual degradation. While the City has recently seen an infusion of funding for blight removal, contractors completing this work have been improperly using fire hydrants, causing hydraulic disturbances that dislodged and suspended settled debris, which may have contributed to the bacterial contamination.

The winter of 2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30%, saw even greater losses since February due to an increase in cold weather related water main breaks and leaks. The City lacks a formal maintenance program for its over 7,250 valves, which would normally be used to limit impacts during break repairs. Two valves on the transmission line used to supply the area of the BWA were found to be closed during the City's investigation, causing longer residence time, reduced disinfectant residual, reduced flow, and reduced pressure.

The BWA's also occurred during the warmest and for 2014 relatively wet periods of August and September. Warm weather conditions are not only more conducive to bacterial growth but also degrade the water's disinfectant residual carried out from the WTP more quickly. Longer residence times, biofilms, and tuberculation also contribute to disinfectant residual degradation. Warm wet weather conditions also allow water contaminated with bacteria to pool around piping with leaks and breaks.

During the summer, the city was actively repairing the distribution system. After the switch to the Flint River, it was discovered that there were many broken or closed valves in the city's distribution system. As the city began correcting this problem they did experience issues of bacteria in the distribution system as a result of the repairs. This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

2. How were the violations detected and what was DEQ's response?

The Boil Water Advisories (BWAs) which occurred in the City of Flint were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the City of Flint collaboratively in consultation with the DEQ.

Regulations regarding monitoring and standards for bacteria in water distribution systems were developed by the EPA, have been in effect since 1990, and incorporated into the Michigan Safe Drinking Water Act. There are a variety of bacteria, parasites, and viruses which can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, water systems test for Total coliform and E.coli. Total coliform bacteria react to water treatment in a manner similar to many pathogens. Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system minimizes the likelihood that pathogens are present. E.Coli is itself a pathogen, and its detection would be direct evidence of a health risk.

Once a BWA has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Using the most common analytical method, samples must be incubated for a period of 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a BWA. Adding each of these steps together, a normal response period to cancel a BWA under these circumstances would be expected to take at least 3 to 4 days.

A BWA was issued from August 15–20, 2014, for a portion of the City of Flint due to localized detections of total coliform and E.Coli bacteria. Another BWA was issued from September 5-9, 2014, due to localized detections of total coliform bacteria in the same and adjacent portions of the City of Flint. The advisory covered an area approximately 6 square miles. The City of Flint has a total land area just over 34 square miles.

V. TTHM violations

1. What caused the TTHM violations experienced by Flint beginning in late Summer 2014?

TTHMs and HAA5s are the result of organic material in the water reacting with disinfectant used to treat the water. The Flint River has higher levels of organic material than water in the Great Lakes and it was not a surprise that the water produced by the city of Flint developed higher disinfection by-products than the water provided by DWSD. However, because the water treatment plant was previously operating intermittently as an emergency backup supply, it was not possible to predict disinfection byproduct formation until the city began relying on it continuously.

2. How were the violations detected and what was DEQ's response?

In preparation to rely on the Flint River, the city installed ozone to help reduce the organic material (known as precursors), but additional measures were necessary. Because TTHM and HAA5 MCLs are calculated based on a running annual average at a specific location, the city didn't actually violate the safe drinking water act standard until the fall, but because it was apparent in the summer of 2014 that the standard would eventually be exceeded, the city was asked to proactively implement measures to address the problem before the violation required them to do so. The city added granular activated carbon to their filters (after receiving a construction permit from DEQ on date?) and levels of TTHMs and HAA5s were reduced. The city returned to compliance with the running annual average (MCL) on September 1, 2015.

IV. The taste, odor, and smell complaints received by Flint

1. What caused the taste and odor complaints received by Flint from residents?

Taste and odor issues are very personalized. Some water systems receive complaints because of too much disinfectant. In Flint, during the summer after the switch to the Flint River as a water source, taste and odor complaints increased. It was believed at the time to be the result of changes in hydraulic conditions within the distribution system. Water leaving the water treatment plant did not have any unusual odor or color. However, construction in the distribution system, hydrant flushing and changes in flow characteristics are all know causes of disturbances with the distribution system that can cause an increase in taste and odor complaints.

2. What was DEQ's response?

DEQ consulted with the city regarding these complaints. The city indicated that they were offering testing for anyone that had issues and that they were not able to verify the complaints. Jugs of discolored water were being brought to meetings, but city personnel were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHM's, it was anticipated that there would be short term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) can and will cause temporary problems as described. Based on information from the city personnel, it appeared that the complaints were related to operational activities occurring in the distribution system.

V. The lead issues in the Flint drinking water

1. What causes lead in drinking water?

Lead is rarely found in source water, but enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead pipes, fixtures and solder. The most common problem is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially hot water. Lead can leach into water from pipes, solder, fixtures and faucets (brass), and fittings. The amount of lead in tap water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the pH of the water, and its temperature.

2. What are the lead action levels?

For most contaminants, EPA sets an enforceable regulation called a maximum contaminant level (MCL) based on the MCLG. MCLs are set as close to the MCLGs as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies. However, because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, EPA established a treatment technique rather than an MCL for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to ensure control of a contaminant. The treatment technique regulation for lead (referred to as the Lead and Copper rule) requires water systems to control the corrosivity of the water. The regulation also requires systems to collect tap samples from sites served by the system that are more likely to have plumbing materials containing lead. If more than 10% of tap water samples exceed the lead action level of 15 parts per billion, then water systems are required to take additional actions including:

- Taking further steps optimize their corrosion control treatment (for water systems serving 50,000 people that have not fully optimized their corrosion control) .

- Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.

- Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

3. Are there any safe levels of lead?

The SDWA requires EPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. These non-enforceable health goals, based solely on possible health risks are called maximum contaminant level goals (MCLG) The MCLG for lead is zero. EPA has set this level based on the best available science which shows there is no safe level of exposure to lead.

4. What is the LCR?

Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. On June 7, 1991, EPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR).

The treatment technique for the rule requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 15 ppb or copper concentrations exceed an action level of 1.3 ppm in more than 10% of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the action level for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control.

5. Did DWSD have a corrosion control plan?

After the LCR was passed, DWSD conducted two rounds of monitoring at for lead and copper. Copper levels were well below action level limits; but lead levels exceeded the action level of 15 parts per billion in many of their customer communities. As a result, DWSD needed to install corrosion control treatment. DWSD performed a corrosion control study and concluded that they could reduce the corrosivity of the water by the addition of an ortho-phosphate.

6. Did DEQ require Flint to have a corrosion control plan in place when it switched to the Flint River as its source of drinking water?

No. The DEQ believed there were two ways under the lead/copper rule to deem a water supply as providing "optimal corrosion control" – either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment. DEQ staff thought it was appropriate to call for the city of Flint to perform two 6-month rounds of monitoring to demonstrate if the city was practicing optimal corrosion control treatment. According to state regulations (R325.604f (2) (iii), a system can demonstrate that it is "practicing optimal corrosion control" by sampling in two, consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the Flint River has 0 ppb lead, the city would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods.

In addition, the city of Flint had been purchasing water from DWSD that was treated for corrosion control. It was DWSD that was considered as having optimized corrosion control at that point. Since the city of Flint had not been the supplier of water before, DEQ did not require the city to "maintain" corrosion control for which it was not responsible. It couldn't "maintain" something that it wasn't doing. As we stated previously, we believed Flint should have been afforded the same opportunity that all other large water systems were

initially granted to demonstrate optimal corrosion control treatment through full scale monitoring. For these reasons, two 6-month rounds of monitoring, as required by the lead/copper rule were felt to be appropriate to determine whether or not optimal corrosion control was being achieved.

7. How does DEQ calculate the 90th percentile?

To determine the 90th percentile of a list of lead or copper results, the following steps are followed:

Step 1: Place lead or copper results in ascending order
Step 2: Assign each sample a number, 1 for lowest value
Step 3: Multiply the total number of samples by 0.9 – this yields the 90th percentile sample. For example: 20 samples x 0.9 = 18th sample. This is the 90th percentile level.

Calculating the 90th percentile is easiest when a supply collects 10 samples (or a multiple of 10). Multiples of 10 require no averaging or interpolation.

8. What was the result of the first round of monitoring conducted by Flint?

The first 6-month round of lead and copper monitoring conducted by the city of Flint ended on December 31, 2014. One hundred samples 100 samples were submitted and the 90th percentile lead level was calculated to be 6 parts per billion.

A 90th percentile lead result of 6 ppb is not unusual. Many water supplies in Michigan and across the country have 90th percentile levels of lead greater than this. Even systems that have installed treatment and are considered optimized by definition can and do have levels above 5 ppb.

9. What was the result of the second round of monitoring conducted by Flint?

The second 6-month round of lead and copper monitoring conducted by the city of Flint ended on June 30, 2015. Sixty nine samples were submitted and the 90th percentile lead level was calculated to be 11 parts per billion. The conclusion from these results was that the city exceeded the level required to be deemed as having optimized corrosion control but did not exceed the action level of 15 parts per billion.

10. What actions did DEQ order Flint to undertake after the second round of monitoring?

While the City's LCR compliance monitoring continued to meet action level requirements, the LCR requires all large systems (those serving over 50,000 people) to optimize corrosion control regardless of their 90th percentile lead concentration. Following receipt of Flint's compliance monitoring results, the DEQ required the city to install corrosion control treatment in correspondence dated August 17, 2015.

Under the LCR, the city has 6 months to let the DEQ know whether it intends to conduct a study, 18 months to perform the study, and 24 months to complete installation of corrosion control. The DEQ has requested the city of Flint to accelerate this schedule. The city submitted plans and specifications to install corrosion control treatment and a construction

permit was issued by DEQ on October 28, 2015. The City is in the process of installing the necessary equipment and procuring the appropriate chemicals. Treatment is expected to be on-line by the end of November.

11. What had DHHS advised DEQ regarding blood lead levels prior to DEQ ordering Flint to implement optimized corrosion control?

In an e-mail dated July 28, 2015, DHHS indicated that they "compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –

- Lead testing rates remained about the same from year to year (chart on the right).
- There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).
- However that pattern was not terribly different from what we saw in the previous three years, especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).
- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspect that the summer data spike may be related to this effect.
- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015."

Insert GRAPHS?

This e-mail in concert with the completion of two 6-month rounds of lead compliance sampling data indicating that the City of Flint had not exceeded an action level for lead provided the basis for DEQ to maintain that the water in Flint continued to be in compliance with the SDWA and was safe for consumption.

12. When did DEQ first become aware of allegations of elevated blood levels being detected in certain children?

The DEQ was notified on August 23, 2015 by a professor from Virginia Tech that "over the next few months we will be studying Flint water quality issues..." and similarly notified by U.S. EPA on August 28, 2015. Results indicating elevated lead levels in homes were reported as part of this study in late August.

By this time, the City of Flint had already completed the required two 6-month rounds of monitoring and a determination had been made by the DEQ that the City must install corrosion control treatment in

[Hurley and Edwards all after the fact]

VI. Questions raised regarding DEQ's actions

1. What was DEQ's response to EPA's inquiry in February 2015 regarding the optimized corrosion control treatment being implemented by Flint under the LCR?

DEQ indicated that the city was in compliance with the lead/copper rule. 90th percentile levels were below the Action Level and not unusual. The city was already conducting the second round of monitoring which would provide for a determination of whether or not second round of monitoring which would provide for a determination of whether or not additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the lead/copper rule that lead or copper results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile action level in the rule.

2. Did DEQ attempt to mislead EPA in a February 27, 2015 email responding to EPA's inquiry regarding OCCT?

No. There is an e-mail from Steve Busch indicating that the city was practicing corrosion control. This was a misstatement. What was meant was that the city was performing the required monitoring to determine whether or not they were "practicing optimal corrosion control". It was clarified in follow-up telephone conversations with EPA.

3. Has EPA subsequently admitted that the LCR is subject to differing interpretations such as that presented by DEQ?

On November 3, 2015, U.S. EPA issued a Memorandum regarding the "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems". This memorandum addresses concerns raised about the application of the LCR, specifically the requirements pertaining to maintenance of optimal corrosion control treatment, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. The memo states that this type of situation rarely arises, that the language of the LCR does not specifically discuss such circumstances, and that there are differing possible interpretations of the LCR with respect to how the rule's optimal corrosion control treatment procedures apply to this situation. The memo is intended to clarify prospectively steps agencies should take/apply in the future.

4. Did DEQ reject any of the samples submitted by Flint?

Yes, samples at two locations were excluded from the compliance calculation.

Compliance samples must be a first draw, 1 liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted sampling sites, called tier 1 sampling sites. For a municipality such as the City of Flint, the tier 1 sampling pool must consist of single family structures that are:

- served by a lead service line,
- contain lead pipes, or
- contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

Furthermore, if a community has tier 1 sites that contain lead services, they are required to have at least 50% of their compliance samples collected from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters, etc. One of the samples submitted by Flint that was excluded from the 90th percentile compliance calculation in the latest monitoring period was taken from a tap at a non-residential site, and the other sample result that was removed was collected from a single family home that has whole house treatment system (check with Steve). Both of these sites are therefore statutorily excluded from the compliance consideration. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point of use or point of entry treatment can only be used if the community has insufficient tier 1 sites available.

5. **Did DEQ review the information submitted by Flint to ensure all samples were from Tier 1 sites?**

6. **Did DEQ believe the levels of lead found at 212 Browning in April 2015 were indicative of a system-wide problem?**

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The reason for this connection is unknown. The city replaced the lead service line. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem. Subsequent sampling taken at this address showed that replacement of the service line mitigated the problem. There was also no reason to believe that this was indicative of a system-wide problem.

7. **Do DEQ's sampling instructions comply with the LCR?**

8. **Does DEQ require the use of small-neck bottles to obtain samples?**

9. **Why was Flint required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?**

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of the Michigan SDWA.

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples Flint was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census (check with Steve), which listed the city's population as more 100,000 residents. In March of 2015, the city provided an updated census that indicated the city's population had decreased to less than 100,000 (check with Steve). Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

10. Why did DEQ admit it made a mistake?

Meeting/ Policy Briefing Template

Policy or Meeting Topic

Staff Lead

(This is the person the Governor can email/ call with questions)

Purpose of Meeting/ Policy Paper

Decision Points

Deadlines

Recommendation

Key Stakeholders Positions

EO:

Dept:

Legislature:

Outside Interest:

Current Press/ Communications

Executive Summary

Background/ Attachments

Background of the Lead/Copper Regulations for Drinking Water and the city of Flint

The U.S. EPA promulgated a treatment technique rule for control of lead and copper (Lead/Copper Rule or LCR) in drinking water in 1991. The purpose of this rule was to control the corrosive properties of drinking water to minimize the amount of lead and copper that would dissolve in the water and be transported to the customer. As such, the monitoring scheme was based upon sampling a statistically significant number of residences containing leaded plumbing materials as a measure of successful water treatment efficacy. The monitoring scheme was not intended to represent human intake, and health studies undertaken in recent years do not show a direct correlation between water sampling results and the blood lead concentrations measured in children.

The LCR also recognized that the primary source of lead exposure is not from drinking water. The largest sources of lead exposure are from lead containing dust in homes that have lead paint and from

lead contaminated soils along major traffic arteries where deposition of automobile exhaust historically occurred when gasoline contained lead. Furthermore, the primary sources of lead in drinking water are plumbing materials containing lead that are not under the control or ownership of the public water system. The LCR is an attempt to reduce the leaching of lead (and copper) from these plumbing materials.

During the twenty-five years of implementation of the LCR, some requirements have been declared unconstitutional; EPA has revised the regulation (in 2000) and provided hundreds of pages of guidance; states have had to make several implementation adjustments to make it function successfully; and most recently, EPA created a LCR Workgroup under the National Drinking Water Advisory Council (NDWAC) to provide recommendations for further LCR modifications. This workgroup just issued their final report that is now being studied by EPA, states and the regulated community. The LCRWG specifically recommends that EPA revise the LCR to require proactive lead service line replacement programs, strengthen optimal corrosion control treatment (OCCT), modify monitoring requirements, and establish a health-based household action level for lead, among others.

It is noteworthy that the LCRWG report did not include a recommendation to change the sampling protocol despite industry wide recognition of the challenging aspect of relying upon nonprofessional homeowners to conduct compliance monitoring as well as concerns that have been voiced about capturing representative exposure levels. The next step will depend upon EPA, which must now promulgate revised federal regulations if they wish to implement any of these recommendations.

Despite the LCR shortcomings, MDEQ compliance data show significant reductions in drinking water lead levels have been achieved through a combination of the following lead control initiatives:

- corrosion control treatment;
- removal of lead in plumbing systems and plumbing products;
- reduction of lead content in plumbing materials;
- lead service line replacements;
- revision of electrical grounding codes; and
- application of flushing principles by informed consumers in high risk locations.

As for Flint, the city has never exceeded the lead action level, either as a customer of Detroit or as an independent system for the year and a half. However, after switching sources (Lake Huron to the Flint River) and treatment methods (chemical softening of the river) in early 2014, the city conducted two 6-month rounds of full monitoring to determine if they were providing OCCT. When the results of the second round were available this past July, the 90th percentile value was calculated. While the city was in compliance with the action level of 15 parts per billion of lead, the city's 90th percentile values for both rounds were above the level of 5 parts per billion at which they could be deemed optimal.

Under the regulatory framework, the city would have as much as 2 years to study, recommend and install OCCT. As a result of the adverse publicity, they are accelerating plans to install OCCT before the end of 2015. Complicating matters are the plans for the city to switch sources again in 2016 when they will be connected to a new 60-mile pipeline from Lake Huron, at which time the current intake in the Flint River will return to a standby mode. When this next switch occurs, the city will be required to continue OCCT, and another two rounds of full monitoring will again be conducted by the city.

Finally, the LCRWG report acknowledged certain concepts underlie their recommendations for possible revisions to the LCR. The following list contains some of these concepts that seem particularly pertinent in Flint:

- There is no safe level of lead. Lead can pose health risks to anyone, but there are heightened risks for pregnant woman, infants and children with both acute and chronic exposures.
- Lead-bearing plumbing materials in contact with drinking water pose a risk at all times, not just when there is a lead action level (LAL) exceedance.
- The presence of lead-bearing materials in premise plumbing raises issues about what systems can implement in customers' homes.
- Effective elimination of leaded materials in contact with water and minimization of exposure to lead in drinking water is a shared responsibility. PWSs, consumers, building owners, public health officials and others each have important roles to play.
- Proactive action is needed to remove the sources of lead, with appropriate incentives both for PWSs and their customers needed to encourage such action.
- Creative financing mechanisms also will be needed to achieve this goal for all individuals potentially exposed to lead, regardless of race, ethnicity or income. Leaving a lead service line in place because a low-income resident does not have the means to pay raises serious questions of disparate impact and environmental justice.
- The public plays a critical role in protecting their families' health by reducing exposure to lead and copper, and informing the public enables them to be effective participants in implementing their share of the responsibility.

City of Flint Drinking Water

Outline prepared by the

Michigan Department of Environmental Quality for the

Flint Water Task Force

I. Introduction

This document is intended to provide an overview of Michigan's implementation of the Safe Drinking Water Act with respect to events in the City of Flint.

II. Background

1. How has Flint historically obtained its drinking water?

The water system in Flint, Michigan, was organized and built under private ownership in 1883 as the Flint Water Works Company to pump raw water from the Flint River to their consumers. In 1903, the system was converted to a municipally owned corporation which supplied drinking water to the City until 1967, when the City switched and become a customer of the Detroit Water and Sewerage Department (DWSD) system. After the switch to DWSD, the city of Flint operated their water treatment plant as a standby, backup emergency plant for purposes of reliability in the event that the single pipeline from DWSD was out of service for any reason.

6/18 - 6/20, 2009
9/10 - 9/13

In 2009, the water treatment plant was operated in this emergency capacity in two instances (dates/number of days). As a backup emergency plant, the city was required to operate the plant quarterly to demonstrate the ability to produce safe water in accordance with Michigan's Safe Drinking Water Act (1976 PA 399) and to keep mechanical equipment in good working order, such as valves, rubber seals, etc. Each time the plant was test run quarterly, samples were taken of raw water quality (before filters) and of finished water (post-filters). Treated water was not put into the distribution system during these test runs, but rather was discharged to the river in accordance with a NPDES Permit (portion with [illegible]). The test runs were for demonstration purposes only and to keep the plant operational and staff familiar with operation in the event it was needed in an emergency.

Monitoring showed that the plant was performing as designed.

2. What State and Federal laws or rules must be complied with in order to ensure safe drinking water is provided to Flint residents?

The federal Safe Drinking Water Act (SDWA) is the primary law that ensures the quality of Americans' drinking water. Under the SDWA, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.

The federal SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. (SDWA does not regulate private wells which serve fewer than 25 individuals.)

The federal SDWA authorizes the United States Environmental Protection Agency (US EPA) to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. US EPA, states, and water systems then work together to make sure that these standards are met.

Originally, the SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

The most direct oversight of water systems is conducted by state drinking water programs. States can apply to US EPA for "primacy," the authority to implement SDWA within their jurisdictions, if they can show that they will adopt standards at least as stringent as US EPA's and make sure water systems meet these standards. Michigan adopted the Safe Drinking Water Act in 1976 and maintained primacy for the program since 1978?

3. **What is EPA's role as a regulatory agency in implementing the SDWA?**

Federal and state governments share responsibility for administering drinking water programs. Under the Safe Drinking Water Act (SDWA), the U.S. Environmental Protection Agency (US EPA) is given the responsibility for developing national standards and regulations that apply to the nation's public drinking water systems and enforcing those standards.

Michigan's drinking water program is audited~~reviewed~~ annually by U.S. EPA for compliance with the SDWA. Based upon those audits, the U.S. EPA has found Michigan's drinking water program to be compliant with the SDWA since [date].

4. **What is DEQ role's as a regulatory agency in implementing the SDWA?**

SDWA also allows states to accept oversight of the drinking water program under an agreement with US EPA giving states primary enforcement (or primacy) responsibilities. In addition to this delegation of federal authority to the states, states also have the power to create additional regulations and programs governing drinking water suppliers through their own legislative and regulatory processes.

The DEQ has primary enforcement authority in Michigan for the Safe Drinking Water Act under the legislative authority of the Michigan Safe Drinking Water Act (Act 399). As such, the division has regulatory oversight for all public water supplies, including approximately 1,425 community water supplies and 10,000 noncommunity water supplies.

Comment [KR(1)]: Define community and noncommunity?

The State of Michigan DEQ engages in a variety of activities to help water systems remain in, or return to, compliance. These activities include: visiting water systems and reviewing their facilities, equipment, and operations; requiring the submission of plans and specifications for waterworks system improvements and issuing construction permits; providing for the examination, certification and regulation of persons operating water supplies; helping

systems invest in preventive measures; providing financial assistance for system improvements; and conducting training sessions.

5. What is Flint's role in implementing the SDWA?

These federal and state programs are separate from the activities performed by water systems. State and federal programs develop regulations and perform oversight and compliance activities, but do not actually treat or deliver water to customers. At the local level, public and private water utilities collect, treat, and deliver drinking water to consumers.

To ensure that drinking water is safe, SDWA sets up multiple barriers against pollution. These barriers include: source water protection, treatment, distribution system integrity, and public information. As a public water system, the city of Flint is responsible for ensuring that contaminants in tap water do not exceed the standards. The City treats the water, and must test their water frequently for specified contaminants and report the results to the State. If a water system is not meeting these standards, it is the water supplier's responsibility to notify its customers.

The SDWA recognizes that since everyone drinks water, everyone has the right to know what's in it and where it comes from. The City of Flint, like all water suppliers, must notify consumers quickly when there is a serious problem with water quality. Water systems serving the same people year-round must provide annual consumer confidence reports on the source and quality of their tap water.

The city of Flint submits samples of their water for laboratory testing (monitoring) to verify that the water they provide to its residents meets all federal and state standards. How often and where samples are taken varies from system to system and contaminant to contaminant. The State provides an annual monitoring schedule to the City setting forth these requirements.

In addition, the city of Flint is required to maintain on staff, certified water operators that are trained and experienced to operate the treatment and distribution system associated with the city's water system.

III. The Flint River – it is a safe source of drinking water?

In Michigan, we are blessed with high quality drinking water sources. Seventy percent of Michigan's population receives its drinking water from surface water sources, most with intakes in the Great Lakes. A handful of public water supplies in Michigan do treat water from inland sources such as rivers or groundwater under the influence of surface water. While river sources present a greater challenge for

[Our impression is that the average citizen is under the impression that the river water is corrosive and contains lead – we can address no lead, chloride, and lime issues. Address treatment issues to show that water leaving the plant meet all SDWA requirements. Ph was same as DWSD. Also sets up point that problems arose after water left plant and was disseminated throughout system]

IV. E. Coli and Total Coliform bacteria violations

1. What caused the E.Coli and Total Coliform bacteria violations experienced by Flint in August-September 2014?

A number of factors, not one specific cause, likely contributed to the Boil Water Advisories (BWA's) in the City of Flint during August and September 2014 triggered by ~~localized~~ exceedances of bacteria standards in limited areas of the D.S. While use of the Flint River increased the amount of natural organic matter in the City's water, the City's water treatment plant (WTP) performed well above treatment requirements for organic carbon removal. In addition, less than 20% of the water system was included in the advisory area. If treatment had been compromised, detections would have been widespread throughout the City, rather than in such a localized area.

The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of cast iron piping. Cast iron pipe is subject to internal corrosion, called tuberculation, which causes buildup on the pipe interior leading to water quality issues, reduced flow and pressures, and leakage. Tuberculation also encourages the development of biofilms, layers of bacteria that attach to the interior pipe wall. Biofilm growth is common in areas of piping with little or no disinfectant residual, and together with tuberculation can clog water lines to the point of insufficient water pressure.

The City has also experienced decades of a declining user base and water use associated with vacant homes, commercial businesses and industrial property. Declining water use leads to excess residence time within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and disinfectant residual degradation. While the City has recently seen an infusion of funding for blight removal, contractors completing this work have been improperly using fire hydrants, causing hydraulic disturbances that dislodged and suspended settled debris, which may have contributed to the bacterial contamination.

The winter of 2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30%, saw even greater losses since February due to an increase in cold weather related water main breaks and leaks. The City lacks a formal maintenance program for its over 7,250 valves, which would normally be used to limit impacts during break repairs. Two valves on the transmission line used to supply the area of the BWA were found to be closed during the City's investigation, causing longer residence time, reduced disinfectant residual, reduced flow, and reduced pressure.

The BWA's also occurred during the warmest and for 2014 relatively wet periods of August and September. Warm weather conditions are not only more conducive to bacterial growth

but also degrade the water's disinfectant residual carried out from the WTP more quickly. Longer residence times, biofilms, and tuberculation also contribute to disinfectant residual degradation. Warm wet weather conditions also allow water contaminated with bacteria to pool around piping with leaks and breaks.

During the summer, the city was actively repairing the distribution system. After the switch to the Flint River, it was discovered that there were many broken or closed valves in the city's distribution system. As the city began correcting this problem they did experience issues of bacteria in the distribution system as a result of the repairs. This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

2. How were the violations detected and what was DEQ's response?

The Boil Water Advisories (BWAs) which occurred in the City of Flint were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the City of Flint collaboratively in consultation with the DEQ.

Regulations regarding monitoring and standards for bacteria in water distribution systems were developed by the EPA, have been in effect since 1990, and incorporated into the Michigan Safe Drinking Water Act. There are a variety of bacteria, parasites, and viruses which can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, water systems test for Total coliform and E.coli. Total coliform bacteria react to water treatment in a manner similar to many pathogens. Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system minimizes the likelihood that pathogens are present. E.Coli is itself a pathogen, and its detection would be direct evidence of a health risk.

Once a BWA has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Using the most common analytical method, samples must be incubated for a period of 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a BWA. Adding each of these steps together, a normal response period to cancel a BWA under these circumstances would be expected to take at least 3 to 4 days.

Upon receiving information indicating total coliform and E.Coli bacteria had been detected, DEQ issued a ~~A~~ BWA ~~was issued~~ from August 15–20, 2014, for the affected ~~a~~ portion of the City of Flint ~~due to localized detections of total coliform and E.Coli bacteria~~ and ordered Flint to take action to resolve the situation. Another BWA was issued by DEQ from September 5-9, 2014, due to localized detections of total coliform bacteria in the same and adjacent

DEQ advised the city of Flint

portions of the City of Flint. The advisory covered an area approximately 6 square miles. The City of Flint has a total land area just over 34 square miles.

No total coliform or E.Coli bacteria detections have been reported in Flint since September 2014.

V. TTHM violations

Total Trihalomethanes (TTHMs)

1. What caused the TTHM violations experienced by Flint beginning in late Summer 2014?

Haloacetic acids (HAA5s)

TTHMs and HAA5s are the result of organic material in the water reacting with disinfectant used to treat the water. The Flint River has higher levels of organic material than water in the Great Lakes and it was not a surprise that the water produced by the city of Flint developed higher disinfection by-products than the water provided by DWSD. However, because the water treatment plant was previously operating intermittently as an emergency backup supply, it was not possible to predict disinfection byproduct formation until the city began relying on it continuously.

2. How were the violations detected and what was DEQ's response?

In preparation to rely on the Flint River, the city installed ozone to help reduce the organic material (known as precursors), but additional measures were necessary. Because TTHM and HAA5 MCLs are calculated based on a running annual average at a specific location, the actual violation of ~~city didn't actually violate~~ the safe drinking water act standard for TTHM did not occur until the fall of 2014, but because it was apparent in the summer of 2014 that the standard would eventually be exceeded, DEQ asked the city ~~was asked~~ to proactively implement measures to address the problem before the violation required them to do so. The city added granular activated carbon to their filters (after receiving a construction permit from DEQ on date?) and levels of TTHMs and HAA5s were reduced. The city returned to compliance with the running annual average (MCL) on September 1, 2015.

IV. The taste, odor, and smell complaints received by Flint

1. What caused the taste and odor complaints received by Flint from residents?

Taste and odor issues are very personalized. Some water systems receive complaints because of too much disinfectant. In Flint, during the summer after the switch to the Flint River as a water source, taste and odor complaints increased. It was believed at the time to be the result of changes in hydraulic conditions within the distribution system. Water leaving the water treatment plant did not have any unusual odor or color. However, construction in the distribution system, hydrant flushing and changes in flow characteristics are all know causes of disturbances with the distribution system that can cause an increase in taste and odor complaints.

2. What was DEQ's response?

Comment [KR(2]: Need to explain that TTHM and HAA5s are. Are they hazardous to public health? Same for disinfection by-products. This is a pretty technical read – can we add plain English or more explanation?

Comment [KR(3]: During our interviews, we received a number of comments that the major problem was because the organic level did not have time to stabilize before being discharged into the system and then stagnation in the system exacerbated the problem. Just passing on that info.

DEQ consulted with the city regarding these complaints. The city indicated that they were offering testing for anyone that had issues and that they were not able to verify the complaints. Jugs of discolored water were being brought to meetings, but city personnel informed DEQ that they were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHM's, it was anticipated that there would be short term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) can and will cause temporary problems as described. Based on information from the city personnel, it appeared that the complaints were related to such operational activities occurring in the distribution system.

V. The lead issues in the Flint drinking water

1. What causes lead in drinking water?

Lead is rarely found in source water, but enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead pipes, fixtures and solder. The most common problem is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially hot water. Lead can leach into water from pipes, solder, fixtures and faucets (brass), and fittings. The amount of lead in tap water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the pH of the water, and its temperature.

2. What are the lead action levels?

For most contaminants, EPA sets an enforceable regulation called a maximum contaminant level (MCL) based on the MCLG. MCLs are set as close to the MCLGs as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies. The MCL for lead is 15 ppb. However, because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, EPA established a treatment technique rather than an MCL for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to ensure control of a contaminant. The treatment technique regulation for lead (referred to as the Lead and Copper rule) requires water systems to control the corrosivity of the water. The regulation also requires systems to collect tap samples from sites served by the system that are more likely to have plumbing materials containing lead. If more than 10% of tap water samples exceed the lead action level of 15 parts per billion, then water systems are required to take additional actions including:

Comment [KR(4)]: MCLG not defined until next section

•Taking further steps optimize their corrosion control treatment (for water systems serving 50,000 people that have not fully optimized their corrosion control) .

•Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.

•Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

3. Are there any safe levels of lead?

The SDWA requires EPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. These non-enforceable health goals, based solely on possible health risks are called maximum contaminant level goals (MCLG) The MCLG for lead is zero. EPA has set this level based on the best available science which shows there is no safe level of exposure to lead.

4. What is the LCR?

Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. On June 7, 1991, EPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR).

The treatment technique for the rule requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 15 ppb or copper concentrations exceed an action level of 1.3 ppm in more than 10% of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the action level for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control.

5. Did DWSD have a corrosion control plan?

After the LCR was passed, DWSD conducted two rounds of monitoring at for lead and copper. Copper levels were well below action level limits; but lead levels exceeded the action level of 15 parts per billion in many of their customer communities. As a result, DWSD needed to install corrosion control treatment. DWSD performed a corrosion control study and concluded that they could reduce the corrosivity of the water by the addition of an ortho-phosphate.

Comment [KR(5]: Any value in indicating that DWSD got 3 years to implement as opposed to the six months given to Flint

6. Did DEQ require Flint to have a corrosion control plan in place when it switched to the Flint River as its source of drinking water?

No. There are ~~DEQ believed there were~~ two ways under the lead/copper rule to deem a water supply as providing "optimal corrosion control" – either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment. DEQ ~~staff thought it was appropriate to call for~~ requested that the city of Flint ~~to~~ perform two 6-month rounds of monitoring to demonstrate if the city was practicing optimal corrosion control treatment. According to state regulations (R325.604f (2) (iii), a system can demonstrate that it is "practicing optimal corrosion control" by sampling in two, consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the

Comment [KR(6]: We don't need to be so defensive in light of EPA memo confirming alternative interpretations

July 14, 2015
cl.

source and the practical quantification limit for lead of 5 ppb. Since the Flint River has 0 ppb lead, the city would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods.

In addition, the city of Flint had been purchasing water from DWSD that was treated for corrosion control. It was DWSD that was considered as having optimized corrosion control at that point. Since the city of Flint had not been the supplier of water before, DEQ did not require the city to "maintain" corrosion control for which it was not responsible. It couldn't "maintain" operations undertaken elsewhere by a different entity for a different source of water ~~something that it wasn't doing~~. DEQ's instructions to Flint were consistent with its past practices and its belief that ~~As we stated previously, we believed~~ Flint should have been afforded the same opportunity that all other large water systems were initially granted to demonstrate optimal corrosion control treatment through full scale monitoring under the applicable rules. For these reasons, two 6-month rounds of monitoring, as required by the lead/copper rule were the required means ~~felt to be appropriate~~ to determine whether or not optimal corrosion control was being achieved.

7. How does DEQ calculate the 90th percentile?

To determine the 90th percentile of a list of lead or copper results, the following steps are followed:

Step 1: Place lead or copper results in ascending order
Step 2: Assign each sample a number, 1 for lowest value
Step 3: Multiply the total number of samples by 0.9 – this yields the 90th percentile sample.
For example: 20 samples x 0.9 = 18th sample. This is the 90th percentile level.

Calculating the 90th percentile is easiest when a supply collects 10 samples (or a multiple of 10). Multiples of 10 require no averaging or interpolation.

8. What was the result of the first round of monitoring conducted by Flint?

The first 6-month round of lead and copper monitoring conducted by the city of Flint ended on December 31, 2014. One hundred samples 100 samples were submitted and the 90th percentile lead level was calculated to be 6 parts per billion.

A 90th percentile lead result of 6 ppb is not unusual. Many water supplies in Michigan and across the country have 90th percentile levels of lead greater than this. Even systems that have installed treatment and are considered optimized by definition can and do have levels above 5 ppb.

Comment [KR(7]: Do we want to put in 2014 examples of DWSD – 2.3 ppb; BWL – 7.8; GR – 2.2 ppb; Kazoo – 13 ppb; Saginaw – 8 ppb, etc. The actual numbers strongly drive home the point.

9. What was the result of the second round of monitoring conducted by Flint?

The second 6-month round of lead and copper monitoring conducted by the city of Flint ended on June 30, 2015. Sixty nine samples were submitted and the 90th percentile lead level was calculated to be 11 parts per billion. The conclusion from these results was that the city exceeded the level required to be deemed as having optimized corrosion control but did not exceed the action level of 15 parts per billion.

10. What actions did DEQ order Flint to undertake after the second round of monitoring?

While the City's LCR compliance monitoring continued to meet action level requirements, the LCR requires all large systems (those serving over 50,000 people) to optimize corrosion control regardless of their 90th percentile lead concentration. Following receipt of Flint's compliance monitoring results, the DEQ required the city to install corrosion control treatment in correspondence dated August 17, 2015 based on the continued and increasing level of lead in the June monitoring that led to the conclusion that additional controls or treatment was needed to achieve optimized corrosion control.

Comment [KR(8)]: Is this what the Aug 17 letter says, or does it turn on the not-optimal conclusion based on the June results?

Under the LCR, the city has 6 months to let the DEQ know whether it intends to conduct a study, 18 months to perform the study, and 24 months to complete installation of corrosion control. The DEQ has requested the city of Flint to accelerate this schedule. The city submitted plans and specifications to install corrosion control treatment and a construction permit was issued by DEQ on October 28, 2015. The City is in the process of installing the necessary equipment and procuring the appropriate chemicals. Treatment is expected to be on-line by the end of November.

11. What had DHHS advised DEQ regarding blood lead levels prior to DEQ ordering Flint to implement optimized corrosion control?

In an e-mail dated July 28, 2015, DHHS indicated that they "compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –

- Lead testing rates remained about the same from year to year (chart on the right).
- There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).
- However that pattern was not terribly different from what we saw in the previous three years, especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).
- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspect that the summer data spike may be related to this effect.
- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015."

Insert GRAPHS?

This e-mail in concert with the completion of two 6-month rounds of lead compliance sampling data indicating that the City of Flint had not exceeded an action level for lead provided the basis for DEQ to maintain that the water in Flint continued to be in compliance with the SDWA and was safe for consumption.

12. When did DEQ first become aware of allegations of elevated blood levels being detected in certain children?

The DEQ was notified on August 23, 2015 by a professor from Virginia Tech that "over the next few months we will be studying Flint water quality issues..." and similarly notified by U.S. EPA on August 28, 2015. Results indicating elevated lead levels in homes were reported as part of this study in late August.

By this time, the City of Flint had already completed the required two 6-month rounds of monitoring and a determination had been made by the DEQ that the City must install corrosion control treatment in

[Hurley and Edwards all after the fact]

VI. Questions raised regarding DEQ's actions

1. What was DEQ's response to EPA's inquiry in February 2015 regarding the optimized corrosion control treatment being implemented by Flint under the LCR?

DEQ indicated that the city was in compliance with the lead/copper rule. 90th percentile levels were below the Action Level of 15 ppb and not unusual when compared to other large Michigan cities. The city was already conducting the second round of monitoring which ~~would provide for a determination of whether or not second round of monitoring which~~ would provide for a determination of whether or not additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the lead/copper rule that lead or copper results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile action level in the rule.

2. Did DEQ attempt to mislead EPA in a February 27, 2015 email responding to EPA's inquiry regarding OCCT?

No. There is an e-mail from Steve Busch indicating that the city was practicing corrosion control. ~~This was a misstatement.~~ What was meant was that the city was performing the required monitoring to determine whether or not they were "practicing optimal corrosion control". DEQ subsequently clarified its position in ~~It was clarified in~~ follow-up telephone conversations with EPA.

3. Has EPA subsequently admitted that the LCR is subject to differing interpretations such as that presented by DEQ?

Comment [KR(9]: The email actually refers to a corrosion control "program", which is the sampling protocol. I think this is a little harsh, but I will defer to you.

Yes. On November 3, 2015, U.S. EPA issued a Memorandum regarding the "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems". This memorandum addresses concerns raised about the application of the LCR, specifically the requirements pertaining to maintenance of optimal corrosion control treatment, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. The EPA~~memo~~ states that this type of situation rarely arises, that the language of the LCR does not specifically discuss such circumstances, and that there are differing possible interpretations of the LCR with respect to how the rule's optimal corrosion control treatment procedures apply to this situation. The memo is intended to clarify prospectively steps agencies should take/apply in the future. By admitting that the LCR is subject to differing interpretations, DEQ believes its interpretation and application of the LCR has been validated.

4. Did DEQ reject any of the samples submitted by Flint?

Yes, samples at two locations were excluded from the compliance calculation in conformance with rules issued by the U.S. EPA.

Under federal rules, c~~C~~ompliance samples must be a first draw, 1 liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted sampling sites, called tier 1 sampling sites. For a municipality such as the City of Flint, the tier 1 sampling pool must consist of single family structures that are:

- served by a lead service line,
- contain lead pipes, or
- contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

Furthermore, if a community has tier 1 sites that contain lead services, they are required to have at least 50% of their compliance samples collected from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters, etc.

One of the samples submitted by Flint that was excluded from the 90th percentile compliance calculation in the latest monitoring period was taken from a tap at a non-residential site, and the other sample result that was removed was collected from a single family home that has whole house treatment system (check with Steve). Both of these sites are therefore ~~statutorily~~ excluded from the compliance consideration based upon federal rules. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point of use or point of entry treatment can only be used if the community has insufficient tier 1 sites available.

5. Did DEQ review the information submitted by Flint to ensure all samples were from Tier 1 sites?

6. Did DEQ believe the levels of lead found at 212 Browning in April 2015 were indicative of a system-wide problem?

yes ✓

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. ~~The reason for this connection is unknown.~~ The city replaced the lead service line. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem. Subsequent sampling taken at this address showed that replacement of the service line mitigated the problem. There was also no reason to believe that this was indicative of a system-wide problem.

7. Do DEQ's sampling instructions comply with the LCR?

8. Does DEQ require the use of small-neck bottles to obtain samples?

9. Why was Flint required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of the Michigan SDWA.

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples Flint was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census (check with Steve), which listed the city's population as more 100,000 residents. In March of 2015, the city provided an updated ~~census~~ information that indicated the city's population had decreased to less than 100,000 (check with Steve). Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

10. Why did DEQ admit it made a mistake?

City of Flint Drinking Water
Outline prepared by the
Michigan Department of Environmental Quality for the
Flint Water Task Force

I. INTRODUCTION

This document is intended to provide an overview of Michigan's implementation of the Safe Drinking Water Act, 1976 PA 399, as amended (Act 399), with respect to events in the city of Flint (City), Michigan.

II. BACKGROUND

1. How has Flint historically obtained its drinking water?

The water system in the City was organized and built under private ownership in 1883 as the Flint Water Works Company to pump raw water from the Flint River to their consumers. In 1903, the system was converted to a municipally-owned corporation which supplied drinking water to the City. In 1967, the City ~~switched and~~ became a customer of the Detroit Water and Sewerage Department (DWSD) system.

After the switch to DWSD, the City operated their water treatment plant as a standby plant for purposes of reliability in the event of an emergency such as an interruption in service via the single pipeline from DWSD. In the last ten years, the plant was used as an emergency backup during two weeks in 2009: June 18 through June 20 and September 10 through September 13.

~~However,~~ As a backup emergency plant, the City was required to operate the plant quarterly to demonstrate the capability to produce safe water in accordance with Act 399 and to keep mechanical equipment (such as valves, rubber seals, etc.) in good working order. Each quarter, the plant was test run and samples were taken of both raw water and of finished water (post-filters). Monitoring showed that the WTP was performing as designed. ~~However, as a result of~~ contractual obligations with DWSD, ~~this~~ treated water ~~was~~ not put into the City's distribution system during these test runs, ~~but rather~~ was discharged to the river in accordance with a National Pollutant Discharge Elimination System (NPDES) Permit. The test runs were for demonstration purposes, to keep the plant operational, and staff familiar with operation in the event it was needed in an emergency.

2. What State and Federal laws or rules exist to ensure safe drinking water is provided to City residents?

The federal Safe Drinking Water Act (federal SDWA) is the primary law that ensures the quality of Americans' drinking water. Under the federal SDWA, the United States Environmental Protection Agency (USEPA) sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.

The federal SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and

1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. (The federal SDWA does not regulate private wells which serve fewer than 25 individuals.)

Originally, the federal SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

The most direct oversight of water systems is conducted by state drinking water programs. States can apply to the USEPA for "primacy," the authority to implement the federal SDWA within their jurisdictions, if they will adopt standards at least as stringent as the USEPA's and enforce those standards. Michigan adopted the Safe Drinking Water Act in 1976 through Act 399 and has maintained primacy for the program since that time.

3. **What is the USEPA's role as a regulatory agency in implementing the SDWA?**

Federal and state governments share responsibility for administering drinking water programs. Under the federal SDWA, the USEPA is given the responsibility for developing national standards and regulations that apply to the nation's public drinking water systems and enforcing those standards, by working with states.

Michigan's drinking water program is audited annually by the USEPA for compliance with the federal SDWA. Based upon these audits, the USEPA continues to find Michigan's drinking water program to be compliant with the federal SDWA.

4. **What is the Michigan Department of Environmental Quality's (DEQ) role as a regulatory agency in implementing the SDWA?**

The federal SDWA permits states to accept oversight of the drinking water program under an agreement with the USEPA giving states primary enforcement responsibilities (or primacy). In addition to this delegation of federal authority to the states, states also have the power to create additional regulations and programs governing drinking water suppliers through their own legislative and regulatory processes. Michigan has had regulatory authority providing oversight of public water supplies since 1913 (Waterworks and Sewerage Systems, Act 98 of 1913).

The DEQ has been granted primary enforcement authority in Michigan for the federal SDWA under the statutory authority of Act 399. As such, the DEQ, Office of Drinking Water and Municipal Assistance (ODWMA) has regulatory oversight for all public water supplies, including approximately 1,415 community water supplies and 10,000 noncommunity water supplies. A community water supply provides year-round service to 15 or more living units (homes, apartments, dorm rooms, etc.) or 25 or more residents. A noncommunity water supply has 15 or more service connections or serves 25 or more individuals on an average daily basis for not less than 60 days per year.

The DEQ engages in a variety of activities to help water systems remain in, or return to, compliance. These activities include: conducting surveillance visits (inspections) at water systems and reviewing their facilities, equipment and operations; requiring the submission of plans and specifications for waterworks system improvements and issuing construction permits; providing for the training, examination, certification and regulation of persons operating water supplies; helping systems invest in preventive measures; and since 1996, providing financial assistance for system improvements.

5. **What is the City's role in implementing the federal SDWA?**

State and federal programs develop regulations and perform oversight and compliance activities, but do not treat or deliver water to customers. At the local level, public and private water utilities collect, treat, and deliver drinking water to consumers in compliance with state and federal regulations.

To ensure that drinking water is safe, the federal SDWA sets up multiple barriers against contamination. These barriers include: source water protection, multiple treatment components, distribution system integrity, proper operations oversight, and public information. As a public water system, the City is responsible for ensuring proper design, construction, operations and maintenance, so that contaminants in tap water do not exceed the standards established by law. The City treats the water, and must test their water frequently for specified contaminants and report the results to the DEQ. If a water system is not meeting these standards, it is the water supplier's responsibility to notify its customers.

The federal SDWA recognizes that customers have the right to know what is in their drinking water and where it comes from. The City, like all water suppliers, must notify consumers quickly when there is a serious problem with water quality. Water systems serving the same people year-round must provide annual consumer confidence reports (CCR) on the source and quality of their tap water.

The City submits samples of their water for laboratory testing (monitoring) to verify the water they provide to residents meets all federal and state standards. How often and where samples are taken varies from system to system and from contaminant to contaminant. The DEQ provides an annual monitoring schedule to the City setting forth these requirements.

In addition, the City is required to employ properly certified water operators that are trained and experienced to operate the treatment and distribution systems associated with the City's water system.

6. **What approvals were needed from DEQ in order for the City to begin using their water treatment plant full time.**

The City had long ago been issued construction permits for raw water pumps to withdraw water from the Flint River and the City was grandfathered under the Water Withdrawal

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program (Act 327) as were all existing community public water systems at that time. There were no additional DEQ permissions or authorizations required.

Under Act 399, there are no licenses or permits required to operate. Two construction permits were issued prior to the treatment plant changing from an emergency back-up plant to full time operation. These permits were for small changes such as new chemical feed equipment, changes to the electrical service, etc.

III. THE FLINT RIVER – IS IT A SAFE SOURCE OF DRINKING WATER?

In Michigan, we are fortunate to have high quality drinking water sources. Seventy percent of Michigan's population on a public water supply receives its drinking water from surface water sources, the majority of which is withdrawn from the Great Lakes. A handful of public water supplies in Michigan do treat water from inland rivers, lakes or groundwater under the influence of surface water. All surface water sources and groundwater under the influence of surface water requires significant treatment in order to be safe for consumption. Treatment of surface water is referred to under Act 399 as "complete" treatment."

While all surface water sources must receive this higher level of treatment, river sources present a greater challenge than water withdrawn from one of the Great Lakes. River sources are more challenging to treat because of how rapidly water quality may change compared to Great Lakes sources. Under most circumstances, rivers are also prone to greater fluctuations in temperature, have higher amounts of organic material, greater turbidity (suspended solids), and are more vulnerable to microbiological and viral contamination than Lakes Huron, Erie, Michigan or Superior. It should be noted, that while the water chemistry in the Flint River differs from that in Lake Huron, it can still be treated in accordance with the federal SDWA and Act 399. Many cities across the country rely on similar sources for drinking water. The waterworks industry has the technology to treat wide ranging source waters to provide potable and palatable drinking water, including direct reuse of wastewater. Regardless of source water quality, all public water systems must comply with the same drinking water standards in the finished water.

Also, it is not the source water that reacts with the homeowners plumbing out in the distribution system, but rather the finished water quality that is important. Neither the Flint River nor the treated water leaving the City's WTP contain lead. In addition, the treatment process employed by the City includes lime softening to reduce the hardness in the river water. Lime softening is not a process that water supply professionals would expect to increase corrosivity of water. The City, however, does practice recarbonation to readjust pH at the end of the softening process. pH levels of finished water leaving the City's WTP averaged 7.7. Water monitoring conducted quarterly at 25 sample sites located throughout the distribution system showed the following:

July – September 2014	average pH = 7.71	range: 7.56 – 7.86
October – December 2014	average pH = 7.88	range: 7.62 – 8.10
January – March 2015	average pH = 7.81	range: 7.60 – 7.99

Comment [LJSS1]: Check on this.

April – June 2015 average pH = 7.63 range: 7.48 – 7.80

The following data was obtained at the same sampling locations throughout the City's distribution system, but while they were still purchasing water from DWSD before the City switched to the River as a source:

January – March 2014 (DWSD)	average pH = 7.47	range: 7.40 – 7.54
April 2014 (DWSD)	average pH = 7.49	range: 7.42 – 7.59

Note that the pH of the treated water produced while the City was using the Flint River did not differ significantly from pH values seen in the distribution system during the time the City purchased water from DWSD. Rather, the pH of water produced by the City while using the Flint River indicated a less corrosive water (higher pH).

IV. *E. COLI* AND TOTAL COLIFORM BACTERIA VIOLATIONS

1. What caused the *E.Coli* and total coliform bacteria violations experienced by the City in August and September 2014?

A number of factors, not one specific cause, likely contributed to the Boil Water Advisories (BWAs) in the City during August and September 2014 triggered by exceedances of bacteria standards in limited areas of the distribution system. In addition, the coliform detections were confined to less than 20 percent of the water system. If treatment had been compromised, detections would have been expected throughout the City rather than in such a limited geographic area.

Instead, the violations seem to have been caused by other factors such as aging infrastructure and unusual weather patterns. The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of unlined cast iron piping. This cast iron pipe is subject to internal corrosion called tuberculation, which thins and weakens the pipe walls in some areas and causes a buildup of sediment and debris on the pipe walls in other areas. Tuberculation can lead to water quality issues as well as reduced flows and pressures. Tuberculation also encourages the development of biofilms or layers of bacteria that attach to the rough surfaces of interior pipe walls. Biofilm growth is common in areas where little or no disinfectant residual is maintained.

The City has also experienced decades of a declining customer base and water use, with vacant homes, commercial businesses and industrial property. Declining water use leads to excess residence time (water age) within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and loss of disinfectant residual. While the City has recently seen an infusion of funding for blight removal, contractors completing this work have been known to improperly use fire hydrants, causing hydraulic disturbances that dislodged and suspended settled debris, which may have contributed to the bacterial contamination. These hydraulic disturbances were also believed to be a source of the aesthetic water quality complaints both the city and DEQ were receiving.

The winter of 2013/2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30 percent, saw even greater losses since February ~~of that year~~ due to an increase in cold weather related water main breaks and leaks (City personnel reported 400 water main breaks in calendar year 2014, with greater than 50 percent in the winter quarter). The City has also been lacking a formal maintenance program for its more than 7,250 valves, which are critical in limiting the areas impacted during water main repairs. As an example, two valves on the transmission line used to supply the area of the 2014 BWAs were found to be closed during the City's investigation of possible sources, causing much longer residence times, reduced disinfectant residuals, and reduced pressures – all potential avenues for contamination to enter a distribution system.

The BWAs also occurred during the warmest and relatively wet periods of August and September 2014. Warm weather conditions are not only more conducive to bacterial growth but also degrade disinfectant residuals more quickly. As already explained, longer residence times, biofilms, and tuberculation contribute to disinfectant residual degradation. Warm, wet weather conditions also allow water contaminated with bacteria to accumulate or pond around piping that leaks and breaks.

During the summer of 2014, the city was actively repairing the distribution system (City personnel reported 29 water main breaks in June through August 2014). After the switch to the Flint River, it was discovered that there were many broken or closed valves in the distribution system (City personnel reported 120 broken valves and 239 valves in an improper position). As the city began correcting this problem they did detect the presence of coliform organisms in the distribution system in the testing conducted as a result of the repairs. This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

2. How were the violations detected? What was the DEQ's response?

Federal SDWA regulations regarding monitoring and standards for bacteria in water distribution systems are incorporated into Act 399. There are a variety of bacteria, parasites, and viruses which can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, water systems are required to test for total coliform and *E.coli*. Total coliform bacteria, while not pathogenic, often originate from the same sources as many pathogens. Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system indicates a minimal likelihood that pathogens are present. *E.Coli* is itself a pathogen and its detection is considered direct evidence of a health risk.

The BWAs which occurred in the City were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the City ~~collaboratively in~~ consultation with the DEQ.

Upon receiving information indicating total coliform and *E. Coli* bacteria had been detected, DEQ advised the City to issue a BWA from August 15 through 20, 2014, for the affected portion of the City. Another BWA was issued from September 5 through 9, 2014, due to localized detections of total coliform bacteria in the same and adjacent portions of the City. The advisory covered an area approximately 6 square miles or less than 20 percent of the water department's service area of just over 34 square miles.

Once a BWA has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Using approved analytical methods, samples must be incubated for 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a BWA. Adding each of these steps together, a normal response period to rescind a BWA under these circumstances would be expected to take 3 to 4 days.

No ~~total coliform or *E. coli* bacteria detections~~ have been reported in the City since September 2014.

V. TOTAL TRIHALOMETHANES (TTHM) VIOLATIONS

1. What caused the TTHM violations experienced by the City beginning in late summer 2014?

Disinfectants are an essential element of drinking water treatment because of the barrier they provide against waterborne disease-causing microorganisms. However, disinfection byproducts (DBPs) form when disinfectants used to treat drinking water react with naturally occurring materials in the water (e.g., decomposing plant material). A major challenge for water suppliers is how ~~to control and limit the risks from pathogens and disinfection byproducts. It is important~~ to provide protection from pathogens while simultaneously minimizing health risks to the population from disinfection byproducts.Total Trihalomethanes (TTHM – chloroform, bromoform, bromodichloromethane, and dibromochloromethane) and halogenated acetic acids (HAA5 – monochloro-, dichloro-, trichloro-, monobromo-, dibromo-) are widely occurring classes of DBPs. The amount of TTHM and HAA5 in drinking water from one water system can change from day to day, depending on the season, water temperature, amount of chlorine added, the amount of plant material in the water, and a variety of other factors. All community water systems that chemically disinfect or purchase water that has been chemically disinfected are required to monitor for DBPs

The Flint River has higher levels of organic material than water in the Great Lakes and as a result the water produced by the City developed higher DBPs than the water provided by DWSD. However, because the WTP was previously operating intermittently as an emergency backup supply with water being wasted rather than entering the distribution system, it was not possible to predict DBP ~~formation~~ until the City began relying on it continuously.

As mentioned previously, the City became aware that there were numerous broken valves and closed valves that should have been open in the distribution system. At this time, the City also began a mapping effort to identify "water age" in the distribution system. The longer the residence time or "water age" the greater the opportunity for the formation of DBPs.

2. How were the violations detected? What was the DEQ's response?

~~In preparing to rely on the Flint River, the City installed an ozone treatment system to help reduce the organic material (known as precursors), but additional measures were necessary.~~ Because TTHM and HAA5 maximum contaminant levels (MCLs) are calculated based on a running annual average at specific distribution system locations, the actual violation of the federal SDWA standard did not occur until the fall of 2014. However, it was apparent in the summer of 2014 that the standard would eventually be exceeded; the DEQ asked the City to proactively implement measures to address the problem before the violation required them to do so.

As a result of maintenance efforts undertaken by the City to repair valves and correct improperly closed valves; the City was able to improve hydraulic characteristics of the distribution system and thereby reduce residence time or "water age" in the system. Operational changes made to reduce the amount of storage in the system also helped reduce residence time which contributed to a reduction in DBP formation.

In addition to operational changes to minimize residence time in the distribution system, the City added granular activated carbon to their filters in July 2015. Levels of TTHMs and HAA5s were reduced and the City returned to compliance with the running annual average (MCL) on September 1, 2015.

Comment [LJ852]: Discuss disinfection moved to later in the process? Until is this true?

VI. THE TASTE, ODOR, AND COLOR COMPLAINTS RECEIVED BY FLINT

1. What caused the taste, odor and color complaints received by the City from residents?

Taste, odor and color issues are very personalized. In the City, during the summer after the switch to the Flint River as a water source, taste, odor, and color complaints increased. At the time, increases in color, odor and changes in taste appeared to occur because of changes in hydraulic conditions within the distribution system. Water leaving the WTP did not have any unusual odor or color. ~~However,~~ construction in the distribution system, hydrant flushing, and changes in flow characteristics are all known causes of disturbances with the distribution system that can cause an increase in taste, odor and color. Aesthetics, such as taste, odor, and color, while a concern, by themselves are not a threat to public health.

2. What was the DEQ's response?

The DEQ consulted with the City regarding these complaints. The City indicated that they were offering testing for anyone that had issues ~~and that they were not able to verify the complaints. Jugs of discolored water were being brought to meetings.~~ But City personnel

informed the DEQ that they were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHMs, it was anticipated that there would be short term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) often causes temporary problems as described. Based on information from City personnel, it appeared that the complaints were related to such operational activities occurring in the distribution system.

VII. LEAD ISSUES IN THE FLINT DRINKING WATER

1. What causes lead in drinking water?

Lead is rarely found in source water. Lead enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead fixtures, and solder. Older homes built prior to World War II, are more likely to contain lead pipes. The most common problem with newer construction is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially hot water. The amount of lead in tap water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the pH of the water, and its temperature.

2. Are there any safe levels of lead?

The federal SDWA requires the USEPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. These non-enforceable health goals, based solely on possible health risks are called maximum contaminant level goals (MCLGs). The MCLG for lead is zero. The USEPA has set this level based on the best available science which shows there is no safe level of exposure to lead.

3. What is the Lead and Copper Rule?

Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. On June 7, 1991, the USEPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR).

The treatment technique for the rule requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 15 ppb or copper concentrations exceed an action level of 1.3 parts per million (ppm) in more than 10 percent of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the AL for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control.

water supplies

the water supplies

4. What is the lead action level (AL)?

For most contaminants, the USEPA sets an enforceable regulation called a maximum contaminant level (MCL) based on the MCL Goal (MCLG). MCLs are set as close to the MCLGs as possible, considering cost, benefits, and the ability of public water systems to detect and remove contaminants at the WTP using suitable treatment technologies. However, because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, the USEPA established a treatment technique rather than an MCL for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to control a contaminant. The treatment technique regulation for lead (referred to as the Lead and Copper Rule) requires water systems that produce drinking water to control the corrosivity of the water. The regulation also requires systems to collect customer tap samples from sites served by the system that are more likely to have plumbing materials containing lead. If more than 10 percent of a system's tap water samples exceed the lead AL of 15 parts per billion (ppb), then water systems are required to take additional actions including:

*Optimizing their corrosion control treatment (for water systems serving 50,000 people that have not fully optimized their corrosion control).

*Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.

*Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

5. Did DWSD have a corrosion control plan?

After the LCR passed in 1991, DWSD and all of their consecutive customer systems conducted two rounds of monitoring for lead and copper. Copper levels were well below AL limits; but lead levels exceeded the AL of 15 ppb in Detroit and many of their customer communities. As a result, DWSD installed corrosion control treatment. DWSD performed a corrosion control study and concluded that they could reduce the corrosivity of the water by the addition of an orthophosphate, a corrosion inhibitor.

6. Did the DEQ require the City to have a corrosion control plan in place when it switched to the Flint River as its source of drinking water?

No. There are two ways under the LCR to deem a water supply as providing "optimal corrosion control" – either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment if it is needed. The DEQ requested that the City perform two 6-month rounds of monitoring to demonstrate if the City was practicing optimal corrosion control treatment. According to state regulations (R325.604f (2) (iii), a system can demonstrate that it is "practicing optimal corrosion control" by sampling in two consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the Flint

River has 0 ppb lead, the City would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods. However, once a system has installed treatment as long as it doesn't exceed the AL of 15 ppb it would also be considered optimized regardless of the 90th percentile level achieved.

In this case, the City had been purchasing water from DWSD that was treated for corrosion control. It was DWSD that was considered as having optimized corrosion control at that point. Since the City had not been the supplier of water before, the DEQ did not require the City to "maintain" corrosion control for which it was not responsible. It could not "maintain" operations undertaken elsewhere by a different entity for a different source of water. The DEQ's instructions to the City were consistent with its past practices afforded to all other large water systems. At the beginning of the LCR, all large systems were initially granted the option to demonstrate optimal corrosion control treatment through full-scale monitoring under the applicable rules. For these reasons, two 6-month rounds of monitoring, as required by the LCR were the required means to determine whether or not optimal corrosion control was being achieved.

7. How does the DEQ calculate the 90th percentile?

To determine the 90th percentile of a list of lead or copper results, the procedure below is followed:

Step 1: Place lead or copper results in ascending order
Step 2: Assign each sample a number, 1 for lowest value
Step 3: Multiply the total number of samples by 0.9 – this yields the 90th percentile sample. For example: 20 samples x 0.9 = 18th sample. This is the 90th percentile level.

Calculating the 90th percentile is easiest when a supply collects 10 samples (or a multiple of 10). Note that the 90th percentile must be interpolated if the number of samples is not a multiple of 10.

8. What was the result of the first round of monitoring conducted by the City?

The first 6-month round of lead and copper monitoring conducted by the City ended on December 31, 2014. One hundred samples were submitted and the 90th percentile lead level was calculated to be 6 ppb. The next step required by DEQ was for the City was to collect a second round of monitoring.

A 90th percentile lead result of 6 ppb is not unusual and did not approach the AL or cause alarm. Many water supplies in Michigan and across the country have 90th percentile levels of lead greater than 6 ppb. Even systems that have installed treatment and are considered optimized by definition can and do have levels between 5 ppb and 15 ppb. For example, in 2014, the following communities had 90th percentile lead results as indicated: DWSD (2.3 ppb), Grand Rapids (2.2 ppb), Kalamazoo (13 ppb), Lansing Board of Water and Light (7.8 ppb), and Saginaw (8 ppb).

9. What was the result of the second round of monitoring conducted by Flint?

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were

The second 6-month round of lead and copper monitoring conducted by the City ended on June 30, 2015. Sixty-nine samples that complied with the site selection criteria submitted and the 90th percentile lead level was calculated to be 11 ppb. The conclusion from these results was that the City, while in compliance with the AL, exceeded the level required to be deemed as having optimized corrosion control.

~~10.9.~~ **Why was the City required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?**

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of Act 399.

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples the City was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census, which listed the City's population as more than 100,000 residents. In March of 2015, the City provided updated information that indicated the City's population had decreased to less than 100,000. Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples—only establishing a minimum number necessary.

Comment [LJSS3]: LDO – need documentation of this

~~11.10.~~ **What actions did the DEQ order the City to undertake after the second round of monitoring?**

While the City's LCR compliance monitoring continued to meet AL requirements, the City exceeded the level required to be deemed as having optimized corrosion control. Following receipt of the City's compliance monitoring results, the DEQ sent a letter on August 17, 2015 requiring the City to install corrosion control treatment.

Under the LCR, the City has 6 months to let the DEQ know whether it intends to conduct a study, then 18 months to perform the study and make their recommendation, and 24 months to complete installation of the selected corrosion control. The DEQ requested the City ~~to~~ accelerate this schedule. The City submitted plans and specifications to install corrosion control treatment and a construction permit was ~~issued by the DEQ~~ on October 28, 2015. The City is in the process of installing the necessary equipment and procuring the appropriate chemicals. Treatment is expected to be on-line by the end of November 2015.

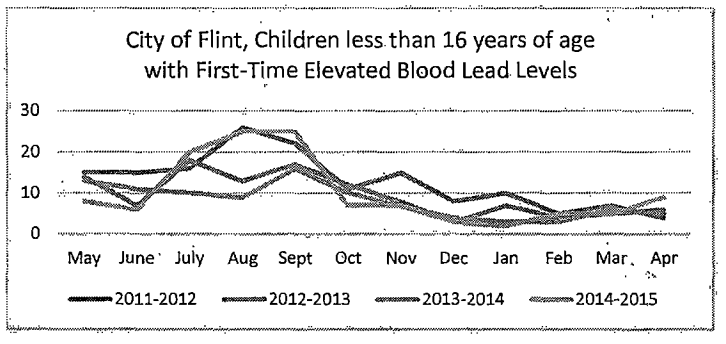
As of October 16, 2015 the city resumed purchasing water from DWSD that is already optimized and provides a corrosion inhibitor. City treatment will further enhance the amount of inhibitor in the system.

~~12.~~11. What had Department of Health and Human Services (DHHS) advised the DEQ regarding blood lead levels prior to the DEQ ordering the City to implement optimized corrosion control?

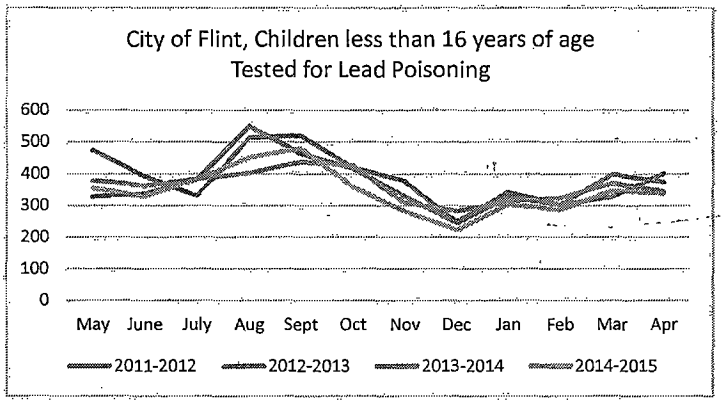
In an e-mail dated July 28, 2015 regarding blood lead testing, the Michigan DHHS indicated that they "compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –

Comment [LJSS4]: Tracy Jo – can you indent the quote here so it's easier to identify?

- Lead testing rates remained about the same from year-to-year (chart on the right).



- There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).



- However, that pattern was not terribly different from what we saw in the previous three years; especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).

- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows,

sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspected that the summer data spike may be related to this effect.

- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015."

This e-mail from DHHS in concert with the completion of two 6-month rounds of lead compliance sampling data indicating that the City had not exceeded an AL for lead provided the basis for the DEQ to maintain that the water in the City continued to be in compliance with the federal SDWA and was safe for consumption.

~~13.~~12. **When did the DEQ first become aware of allegations of elevated blood levels being detected in certain children?**

The DEQ was notified on August 23, 2015, by a professor from Virginia Tech that "over the next few months we will be studying Flint water quality issues..." and similarly notified by the USEPA on August 28, 2015. Results indicating elevated lead levels in homes were reported as part of this study in late August. In early September 2015, information was reported in news articles that pediatricians in the City had data suggesting an increase in children's blood lead levels in two zip codes in the Flint area.

Prior to these dates, the City had already completed the required two 6-month rounds of monitoring and a determination had been made by the DEQ that the City must install corrosion control treatment as documented in correspondence dated August 17, 2015.

VIII. QUESTIONS RAISED REGARDING THE DEQ'S ACTIONS

1. **What was the DEQ's response to the USEPA's inquiry in February 2015 regarding the optimized corrosion control treatment being implemented by the City under the LCR?**

The DEQ indicated that the City was in compliance with the LCR, 90th percentile levels were below the AL of 15 ppb and not unusual when compared to other large Michigan cities. The City was already conducting the second round of monitoring which would provide for a determination of whether additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the LCR that lead results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile AL in the LCR.

2. **Did the DEQ attempt to mislead the USEPA in a February 27, 2015, e-mail responding to the USEPA's inquiry regarding Optimal Corrosion Control Treatment (OCCT)?**

No, there was no attempt by DEQ to mislead USEPA. There is an e-mail from Steve Busch, ODWMA Jackson and Lansing District Supervisor, indicating that the City was practicing a corrosion control program. What was meant was that the City was performing the required monitoring to determine whether or not they were practicing optimal corrosion control.

The DEQ subsequently clarified its position in follow-up e-mails and telephone conversations with the USEPA.

3. When General Motors announced its intent to terminate water service from the City and purchase water from Genesee County, shouldn't this have been a sign that there were concerns with the quality of the water after the switch to the Flint River?

No. General Motors made a decision regarding the quality of water for its manufacturing processes. At the time, the company indicated that the chloride levels were above limits acceptable as part of the manufacturing facility's limit for production purposes. The level of chlorides in the water treated by the City was not a health or aesthetic concern.

Chloride does have a secondary maximum contaminant level(MCL) established by USEPA, not for health related concerns but rather for taste and aesthetic concerns. According to the City's records, the treated water chloride concentration leaving the water treatment plant ranged between 55 and 65 mg/l (milligrams per liter). Concentrations greater than 250 mg/l become objectionable due to taste. It should be noted that the City does use ferric chloride as its primary coagulant and this does add some chloride to the finished water. ~~Since~~ the ~~raw water~~ chloride concentration is generally about 45 mg/l the contribution from ferric chloride is not significant.

3.4 Has the USEPA subsequently admitted that the LCR is subject to differing interpretations such as that presented by the DEQ?

Yes. On November 3, 2015, the USEPA issued a Memorandum to all 50 states regarding the "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems". This memorandum addresses concerns raised about the application of the LCR, specifically the requirements pertaining to maintenance of OCCT, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. The USEPA states that this type of situation rarely arises, that the language of the LCR does not specifically discuss such circumstances, and that there are differing possible interpretations of the LCR with respect to how the rule's OCCT procedures apply to this situation. The memo is intended to clarify prospectively steps agencies should take or apply in the future. ~~The~~ USEPA ~~acknowledges~~ that the LCR is subject to differing interpretations ~~and~~ DEQ ~~believes its~~ interpretation and application of the LCR ~~has been validated~~.

3.5 Did the DEQ reject any of the samples submitted by the City?

Yes, samples at two locations were excluded from the compliance calculation in conformance with rules issued by the USEPA.

According to the LCR, compliance samples must be a first draw, 1-liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool

of targeted high-risk sampling sites, called Tier 1 sampling sites. For a municipality such as the City, the Tier 1 sampling pool must consist of single family structures that are:

- served by a lead service line,
- contain lead pipes, or
- contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

As long as a community has Tier 1 sites that contain lead services, they are required to collect at least 50 percent of their compliance samples from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters, etc.

(non-Tier 1)* One of the samples submitted by the City was excluded from the 90th percentile compliance calculation in the latest monitoring period because it was taken from a tap at a non-residential site. The other sample result that was removed was collected from a single family home that has a whole house treatment system. Both of these sites are, therefore, excluded from the compliance consideration based upon federal rules. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point-of-use or point-of-entry treatment can only be used if the community has insufficient Tier 1 sites available.

5.6. Did the DEQ review the information submitted by the City to ensure all samples were from Tier 1 sites?

Yes. The DEQ examined the information submitted and certified by the City that their LCR ~~sampling pool~~ compliance monitoring sites consisted entirely of ~~lead service lines from single family homes~~ Tier 1 criteria sites, which met the requirements of this rule to maximize sampling of high-risk targeted sites.

(Tier 2) During the initial implementation of the LCR approximately 25 years ago, water supplies were required to complete a materials evaluation of their distribution system to identify a pool of targeted, high-risk sampling sites. These sites were to be categorized into one of three tiers (1, 2, or 3) based on risk. The DEQ created an LCR reporting template for water systems to identify each compliance sampling site by Tier, ~~and if they are in the highest Tier (1), to indicate why these sites qualify by having a lead service line, or because they either have copper piping installed with high lead content solder or they have lead plumbing in the home.~~ *service line material, and building plumbing material.

If a water system has sufficient Tier 1 sites, they are required to sample them before using any lower Tier sites. Furthermore, if they have sufficient sampling sites with lead service lines, they are required to use them to make up at least 50 percent of their sampling pool each monitoring period. Water supplies are also required to use the same sampling sites each time or explain on their LCR reporting form why they were unable to do so. Finally, we ~~require~~ is required the water system to certify all of the information they provide on the LCR reporting form is factual.

The DEQ must rely upon the public water system to identify appropriate sampling sites for LCR monitoring. The DEQ public water supply program has no control or authority over service lines or domestic plumbing. As a result, we have no records on construction standards or materials used by customers for these components. If these records exist, they are kept ~~locally where they are reviewed and approved by local agencies such as building departments or plumbing inspectors.~~ by plumbing code enforcement officials.

In 2015, City employees again certified that the information submitted on their LCR monitoring reports for the two 6-month rounds of monitoring conducted after they began treating the Flint River were accurate, and DEQ staff review of that information indicated it was in compliance with the monitoring requirements. It was not until the DEQ heard City employees revealing to the media that they did not know for certain if their compliance monitoring was collected from homes with lead service lines. As a result, the DEQ began to investigate their monitoring sites. As the City began to transfer their customer information to electronic records, the DEQ determined from the information available that a significant number of these sites that had been listed as having lead service lines either did not have them or the information was unavailable. On November 9, 2015, the DEQ notified the City in writing that it would be necessary to conduct a complete assessment of their sampling pool and report back their findings by December 30, 2015. The DEQ is now awaiting the City's ~~report.~~ response.

the City

HS

~~6.~~7. Did the DEQ believe the levels of lead found at 212 Browning in April 2015 were indicative of a system-wide problem?

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The City replaced the lead service line May 6, 2015. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem, and subsequent sampling taken at this address showed that replacement of the service line did mitigate the problem. There was, therefore, no reason to believe that this was indicative of a system-wide problem.

~~7.~~8. Do the DEQ's sampling instructions comply with the LCR?

We continue to seek official clarification from USEPA regarding the sampling protocols. We have attempted to ensure compliance with the USEPA's guidance provided in the preamble to their lead and copper regulations that said that household use should be "typical" for a residential customer on the day before sample collection for lead and copper. Early in the implementation of the LCR, we had encountered too many situations where compliance samples had been collected from kitchen and bathroom taps that had not been used in days and in some cases, even weeks, resulting in excessively stagnated water and correspondingly high lead levels that did not represent typical exposure expected after overnight stagnation. To incorporate these results into further regulatory decision making could have led to actions that were not indicative of a true public health threat. Further complicating this issue was the USEPA's direct implementation of the LCR in Washington, D.C., where it was learned that some "valid" lead results were not always being included in

compliance calculations. Subsequently, the USEPA made invalidation of samples for any reason much more difficult. In order to ensure samples were taken at customer taps representative of typical use, we devised our current recommendations for ensuring appropriate but not excessive stagnation for LCR monitoring.

We continue to believe it is appropriate to ~~flush these taps the day before sample collection to simulate and/or~~ ensure typical household use before the tap is allowed to sit overnight to ~~achieve the expected stagnation time (the regulation recommends a minimum 6 hours stagnation prior to collecting the first draw sample)~~. The LCR does not say the result should represent the "absolute worst case" condition – it talks about sampling the highest risk locations (lead plumbing, lead service lines, high lead content solder piping, etc.) after overnight stagnation and then collecting a first draw sample so as not to flush elevated lead from that tap at that point in time. There are a number of other States that share DEQ's interpretation of the rule and the DEQ encourages USEPA to provide official clarification directed at all States with primacy.

8.9 Does the DEQ require the use of small-neck bottles to obtain samples?

No. The DEQ does not mandate the use of small-neck bottles; it is the sampling method that is specified in both the federal SDWA and Act 399. Each certified drinking water laboratory provides bottles to their customers upon request for any particular analysis in accordance with the specifications in the SDWA. The bottles provided by the DEQ Drinking Water Laboratory for a lead and copper corrosion control sample meet these requirements.

8.10 Why did the DEQ admit mistakes and apologize?

~~The mobbing Freedom of Information Act Requests brought to the director's attention, information from within the DEQ that was not previously known to Director Dan Wyant – specifically, that the USEPA field staff had raised the question of corrosion control in the spring of 2015 and had been critical of the DEQ's protocol and testing process. It seemed clear that the USEPA field staff had suggested that DEQ staff had employed the incorrect protocol. In the face of that new information, Direct Wyant felt compelled to acknowledge that an error may have been made as part of moving the conversation and the situation forward.~~

~~The subsequent acknowledgement by the USEPA's regional and headquarters leadership that the LCR speaks ambiguously on the issue of continued corrosion control, and that the DEQ did not employ a protocol that was 'wrong,' was of considerable consolation to the DEQ staff but only left agency leadership feeling more resolute that the LCR needs to be changed, and the DEQ is interested in being part of that process.~~

~~Also, there should not have been any disrespect or discredit for those who raised the lead in water issue in Flint. For a tone that did not recognize the seriousness of the issue, Director Wyant did apologize.~~ (Madhu and Brad to revise)

to ensure that taps being sampled are representative of typical household use and do not exceed the recommended stagnation period of 6 – 18 hours.

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Privileged Attorney Client Communication

City of Flint Drinking Water

Outline prepared by the

Michigan Department of Environmental Quality for the

Flint Water Task Force

I. **Introduction**

[Explain purpose of the document]

II. **Background**

1. **How has Flint historically obtained its drinking water?**

   [Short summary showing prior use of Flint River]

2. **What State and Federal laws or rules must be complied with in order to ensure safe drinking water is provided to Flint residents?**

   [Give an overview of SDWA]

3. **What is the role of Flint's role in implementing the SDWA?**

   [Our impression is the average citizen believes that DEQ can dictate to Flint how it must act. It seems important to point out Flint's initial responsibilities and also the responsibilities of its consultant.]

   [Flint is responsible for proposal and ensuring compliance. Flint has a consultant to assist it in achieving compliance]

4. **What is DEQ role's as a regulatory agency in implementing the SDWA?**

   [DEQ review proposal and issues construction permit. Explain DEQ approvals DEQ reviews sample results to determine compliance. Do we want to set forth DEQ's sampling requirements that Adam Rosenthal sent Flint to show DEQ taking action to monitor water quality?]

5. **What is EPA's role as a regulatory agency in implementing the SDWA?**

   [Oversight]

III. **The Flint River – it is a safe source of drinking water?**

[Our impression is that the average citizen is under the impression that the river water is corrosive and contains lead – we can address no lead, chloride, and lime issues. Address treatment issues to show that water leaving the plant meet all SDWA requirements. Ph was same as DWSD. Also sets up point that problems arose after water left plant and was disseminated throughout system]

IV. E. Coli and Total Coliform bacteria violations

1. What caused the E.Coli and Total Coliform bacteria violations experienced by Flint in August-September 2014?
2. How were the violations detected and what was DEQ's response?

[Water leaving treatment plant was fine. Bacteria entered system due to repairs. Focus on DEQ's actions being in compliance with SDWA and being proactive]

V. TTHM violations

1. What caused the TTHM violations experienced by Flint beginning in late Summer 2014?
2. How were the violations detected and what was DEQ's response?

[Discuss high organics in water, lack of time to stabilize, and stagnation due to closed valves. Monitoring when water left treatment plant was fine. Problem due to City infractructure. Increasing flow and GAC solved problem. Focus on DEQ's actions being in compliance with SDWA and being proactive].

IV. The taste, odor, and smell complaints received by Flint

1. What caused the taste, odor, and smell complaints received by Flint from residents?
2. What was DEQ's response?

[Flint couldn't recreate, but not surprising in light of flushing re TTHM problems. DEQ advised waste systems to provide notice. Unsightly, but no violations)

V. The lead issues in the Flint drinking water

1. What causes lead in drinking water?
2. What are the lead action levels?
3. Are there any safe levels of lead?
4. What is the LCR?
5. Did DWSD have a corrosion control plan?
6. Did DEQ require Flint to have a corrosion control plan in place when it switched to the Flint River as its source of drinking water?
7. How does DEQ calculate the 90th percentile
8. What was the result of the first round of monitoring conducted by Flint?

[Focus on not unusual results]

9. What was the result of the second round of monitoring conducted by Flint?

[Actions levels not exceeded, but occt level exceeded]

10. What actions did DEQ order Flint to undertake after the second round of monitoring?

[Emphasize proactive requirements]

11. **What had DHHS advised DEQ regarding blood lead levels prior to DEQ ordering Flint to implement optimized corrosion control?**
12. **When did DEQ first become of allegations of elevated blood levels being detected in certain children?**

[Hurley and Edwards all after the fact]

VI. **Questions raised regarding DEQ's actions**

1. **What was DEQ's response to EPA's inquiry in February 2015 regarding the optimized corrosion control treatment being implemented by Flint under the LCR?**
2. **Did DEQ attempt to mislead EPA in a February 27, 2015 email responding to EPA's inquiry regarding OCCT?**
   [Focus on subsequent clarifications – EPA well aware of DEQ position]
3. **Has EPA subsequently admitted that the LCR is subject to differing interpretations such as that presented by DEQ?**
4. **Did DEQ reject any of the samples submitted by Flint?**
5. **Did DEQ review the information submitted by Flint to ensure all samples were from Tier 1 sites?**
6. **Did DEQ believe the levels of lead found at 212 Browning in April 2015 were indicative of a system-wide problem?**
7. **Do DEQ's sampling instructions comply with the LCR?**
8. **Does DEQ require the use of small-neck bottles to obtain samples?**
9. **Why did DEQ admit it made a mistake?**

Freeman Elementary School

4001 Ogema St. Flint MI 48507

Outlet Sampling and Plumbing Assessment Recommendations



BACKGROUND INFORMATION

On Friday, October 23, 2015, the Department of Licensing and Regulatory Affairs (DLARA) and the Department of Environmental Quality (DEQ) conducted an assessment of Freeman Elementary's plumbing system to gain an understanding of how water moves through the building and what types of plumbing materials are used. The assessment identified the following potential sources of lead leaching into drinking water:

- Lead solder joints on copper piping
- Brass valves and brass fittings
- Brass components in fixtures
- Galvanized piping

The assessment also identified 31 faucets or fountains that provide water for drinking, cooking and/or food preparation. The team developed a sequence for sampling the 31 faucets based on how the water travels through the building.

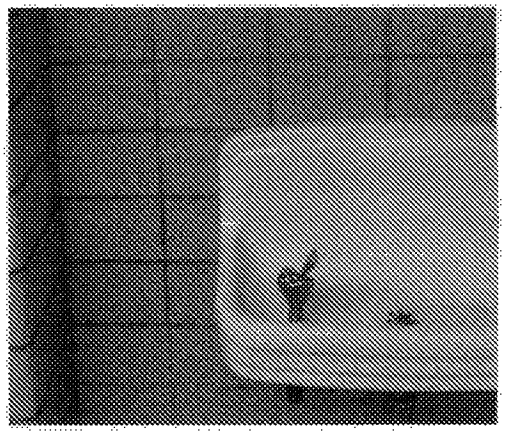
On Saturday, October 24, 2015, the DEQ and the DLARA completed sampling of the 31 faucets/ fountains, in the sequence determined by the plumbing assessment from the previous day, following a stagnation period of 12 hours. At each of the 31 faucets/fountains identified, staff collected four samples. Two initial, 125-mililiter samples (P1 and P2), were collected immediately after turning on the tap. The water was then flushed for 30 seconds and a third, 125-mililiter sample (F1) was collected. Finally, the water was flushed for another two minutes, and a fourth 125-mililiter sample (F2) was collected.

WATER SERVICE INFORMATION

A four inch diameter cast iron water service line enters the school in the boiler room on the west wall. Piping in the boiler room immediately transitions into galvanized metal piping for cold water lines. Two separate galvanized cold water supply lines exit the boiler room. One in the northeast corner appears to serve the gym, auditorium, and proposed pre-K facilities on the north end of the school. The other exits the boiler room in the southwest corner and appears to serve the remainder of the school to the south, including the library. This line was also found to have grounding connections attached to the piping, these connections may enhance pipe corrosion. Hot water is distributed in continuous loops that feed from and return to a central water heater in the boiler room. Hot water piping material where exposed was copper piping with 50/50 lead solder joints. Brass valves were seen throughout the building.

Outlets With Lead Levels Greater Than 15 Parts per Billion

Outlet: **Bubbler Drinking Fountain, Left (DW001)**
Location: Hallway outside Janitorial Room
Results: P1=40 parts per billion, P2=6 partsperbillion, F1=4 parts per billion, F2=1 part per billion



These results suggest the highest contribution of lead may be from the bubbler itself. This bubbler fixture is believed to have a brass valve. The connection underneath the sink also appears to have some brass components including the valve at the wall.

Replacement of this bubbler tap and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

Outlet: **Sink Faucet (CF029)**
Location: DHHS Health Office, west wall
Results: P1=17 parts per billion, P2=12 parts per billion, F1=2 parts per billion, F2= non-detect

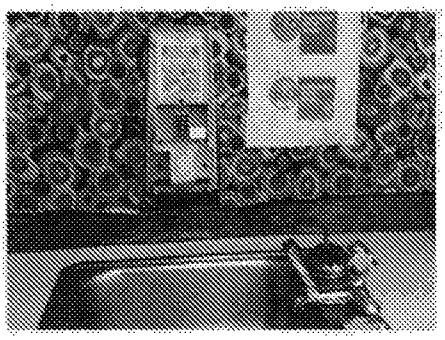


These results suggest the highest contribution of lead may be from the faucet and its connecting plumbing. The faucet is a Delta 400. This model faucet valve has brass components. This style faucet also has a mixing valve that may allow mixing of hot and cold water. Connecting plumbing in the cabinet under the sink may also contain brass components.

This faucet also has an aerator at the outlet. The aerator should be removed, inspected for particulate accumulations, scrubbed clean, and reinstalled. If particulates are found, the aerator should be periodically checked and cleaned.

Replacement of this faucet and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

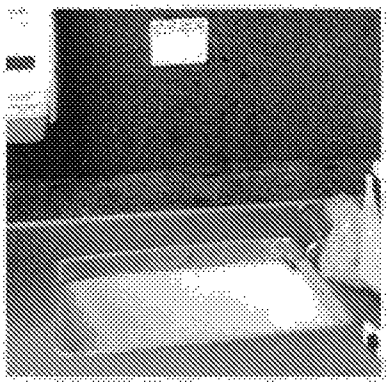
Outlet: **Integrated faucet and bubbler fountain (CF006)**
Location: Classroom 2, south wall
Results: P1=16 parts per billion, P2=3 parts per billion,
F1=1 part per billion, F2=1 part per billion



These results were collected from the faucet portion of the fixture and suggest the highest contribution of lead may be from the fixture itself. The make and model of this fixture is unknown but appears to be made of chrome plated brass and may be connected on the underside of the sink using a brass nipple.

Replacement of this fixture and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

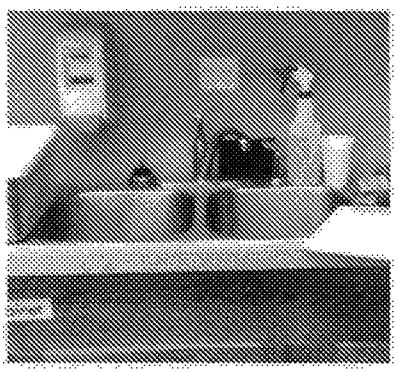
Outlet: **Integrated faucet and bubbler fountain (CF014)**
Location: Classroom 10, north wall
Results: P1=27 parts per billion, P2=7 parts per billion,
F1=4 parts per billion, F2=3 parts per billion



These results were collected from the faucet portion of the fixture and suggest the highest contribution of lead may be from the fixture itself and its connecting plumbing. The make and model of this fixture is unknown but appears to be made of chrome plated brass and may be connected on the underside of the sink using a brass nipple. Connecting plumbing in the cabinet under the sink may also contain brass components.

Replacement of this fixture and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

Outlet: **Sink Faucet (CF013)**
Location: Classroom 10, north wall
Results: P1=9 parts per billion, P2=18 parts per billion
F1=3 parts per billion, F2=3 parts per billion



These results suggest the highest contribution of lead may be from the connecting plumbing with some contribution from the faucet itself. The faucet appears to be a Delta 500 series. This model faucet may have some brass components. This style faucet also has a mixing valve that may allow mixing of hot and cold water. Connecting plumbing in the cabinet under the sink should be checked for brass components including brass valves.

This faucet also has an aerator at the outlet. The aerator should be removed, inspected for particulate accumulations, scrubbed clean, and reinstalled. If particulates are found, the aerator should be periodically checked and cleaned.

Replacement of this faucet and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

Outlet: **Sink Faucet (CF015)**
Location: Classroom 11, northeast corner
Results: P1=102 parts per billion, P2=326 parts per billion, F1=14 parts per billion, F2=11 parts per billion



These results suggest the highest contribution of lead may be from the connecting plumbing and from the faucet itself. The faucet is an older design that uses a brass tube approximately 8 inches in length between the hot and cold water valves, and connects to the outlet under the sink. This brass tube may be the primary source of lead, explaining the higher second (P2) sample result. The faucet and valves may also contain brass components. Connecting plumbing in the cabinet under the sink should be checked for additional brass components including brass valves.

This faucet also has an aerator at the outlet. The aerator should be removed, inspected for particulate accumulations, scrubbed clean, and reinstalled. If particulates are found, the aerator should be periodically checked and cleaned.

Replacement of this faucet and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location and needs to be completed. If replacement is not currently feasible, **DO NOT USE THIS FAUCET FOR DRINKING OR COOKING.**

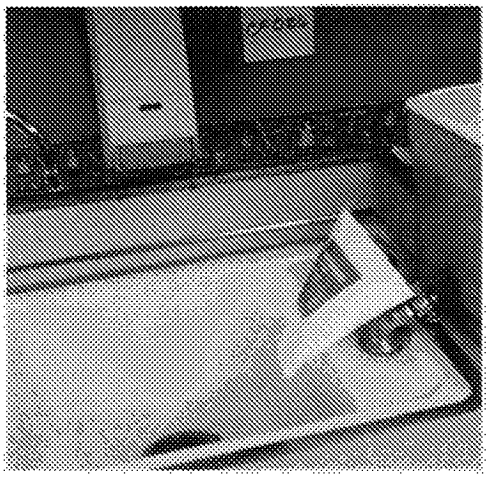
Outlet: **Integrated faucet and bubbler fountain (CF024)**
Location: Classroom 19, east wall
Results: P1=23 parts per billion, P2=3 parts per billion, F1=4 part per billion, F2=3 parts per billion



These results were collected from the faucet portion of the fixture and suggest the highest contribution of lead may be from the fixture itself. The make and model of this fixture is unknown but appears to be made of chrome plated brass and may be connected on the underside of the sink using a brass nipple.

Replacement of this fixture and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

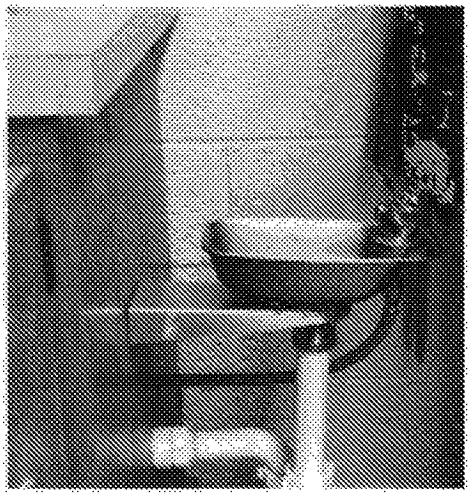
Outlet: **Bubbler fountain (CF026)**
Location: Classroom 14, west wall
Results: P1=36 parts per billion, P2=30 partsperbillion, F1=17 parts per billion, F2=4 parts per billion



These results suggest the highest contribution of lead may be from the bubbler itself. This bubbler fixture appears to be made of chrome plated brass. This style bubbler typically has a 4-5 inch brass fitting that connects to a 3 inch brass nipple on the underside of the sink. This would explain the higher concentrations in the first two sample results. The connection underneath the sink may also have some brass components and should be checked including the valve.

Replacement of this bubbler tap and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location and should be completed. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes prior to each use and for at least 4 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure. **In general, use of this fountain for drinking water should be discouraged.**

Outlet: **Bubbler fountain (CF031)**
Location: Proposed Pre-K room, south wall
Results: P1=57 parts per billion, P2=3 parts per billion, F1=2 parts per billion, F2=non-detect



These results suggest the highest contribution of lead may be from the bubbler itself. This bubbler fixture appears to be made of chrome plated brass. This bubbler has a brass fitting connection to a brass nipple. The connector hose is not expected to be contributing lead.

Replacement of this bubbler tap and its connection plumbing with lead-free materials will significantly reduce lead exposure at this location and should be completed. If replacement is not currently feasible, sample results indicate that flushing this tap for 3 minutes following periods of stagnation is likely to reduce lead concentrations and lead exposure.

Outlets With Lead Levels 15 Parts per Billion or Less

While the remaining 22 outlets showed sample results to be at levels less than 15 parts per billion, several recommendations have been identified.

Several of these outlets are comprised of similar materials as the outlets listed above, and could potentially experience higher lead levels under extended periods of stagnation.

This includes:

- Sink Side Bubbler Units in Room 12 (CF022), Room 5 (CF009), Room 21 (CF028), Hallway Fountain (DW002), Room 15 (CF018), Room 17 (CF020), and Room 1 (DW005).
- Integrated Faucet Bubbler Fountain Units in Room 6 (CF010), Room 9 (CF012), Room 4 (CF008), Room 3 (CF007), and Room 7 (CF011)

Replacement of these fixtures with lead-free materials is also recommended.

The fourth sample at each of these 22 outlets following approximately 3 minutes of use and flushing at a reduced flow reduced lead concentrations to 4 parts per billion or less. This indicates that flushing of all taps used for drinking, cooking, and/or food preparation, for 4 minutes following periods of stagnation will further reduce lead exposure. It is recommended that a flushing operational procedure be developed for use by staff responsible for plumbing operations and maintenance.

[redacted]

Mike Glasgow

Bob, Tim Derry.
Tom, Miguel
Dawn, Mike

(1)

Pb/Cu sampling protocol
optimization testing for change over:
preliminary assessment by Miguel.
- remove pipes to install @ WTP for testing
what info. do we need to excavate pipe?
current inventory of homes w/ LSLs?
testing results — high priority for LSL properties
EBC testing — may have LSLs
water interruption or other disturbances = high risk
addresses of unoccupied homes - monitor
effectiveness of treatment
info. on pressure zones
tasks / timeline -
immediate -
lab capabilities / lab QC/QA
". local partners? who can do the work
— presentation of tasks for recommendations to
City Council + citizens on 12/10.
how much pipe is needed?
current state of scale in pipes
placeholder for $
proposed EPA assistance
Pb service line methodology development.
Corrosion Control Treatment Optimization Evaluation
Sampling in Distribution System. in addition to
pipe loops.

Pb source identification / diagnostic
~~treatment~~ evaluation sampling
Impact of H2O use on lead levels - ~~of~~ risk
after home has been unoccupied for
long period of time.
What is risk? How is it reducing?

Risk Communication -
Pb reservoirs in pipes downstream of
source,
Risk from physical disturbance

Chemistry on pipe as a result of treatment.
pipe scale
pipe set to Cincinnati

Turbidity -

RS Lab can look for a lot more parameters

Pallen Test Analyzer - ? } need sites where you
falling water test - ? } know do and don't have
LSLs.
currently being
used in Montreal.

Bench testing - how much H2O would
be necessary? Send to researcher.
for how long?

Notes on Call with MDEQ on July 21, 2015

MDEQ Implementation of LCR Rule and Flint Issues

Issue #1: Is there a public health concern regarding lead in Flint or other regulatory requirements?

- The 90th percentile results of the 2nd round of monitoring was 11 ppb.
- The population has dropped to under 100,000 and therefore the 1st round of 6-month monitoring was done for 100 samples, but the 2nd round only needed 60 samples.
- Customer-requested samples were included, but MDEQ did not have specifics on how many there were.
- Tinka asked about the timeline for Flint to switch over to the Lake Huron water source. MDEQ said the pipeline is under construction and scheduled to be complete by July 2016. MDEQ expects some delays and thinks a more realistic timeframe is October 2016.
- MDEQ explained that Flint would have 18 months to complete the corrosion control study and the complicating factor of switching over to Lake Huron. Should the corrosion control study be based on the Lake Huron source? MDEQ also explained that once Flint is using Lake Huron water that they would then need to complete 2 more rounds of 6-month monitoring to assess whether any adjustments to the corrosion control treatment was needed.
- MDEQ will be sending a letter to Flint telling them they need to complete a corrosion control study – based on results they are not optimized. Given the timing of completing a corrosion control study and the anticipated switch to Lake Huron water, MDEQ will have discussions with Flint and request that they start corrosion control treatment as soon as possible.
- MDEQ asked for Region 5's opinion on whether the regulations allow for the study requirement for Flint to be waived if MDEQ has Flint start pH adjustments and adding phosphates. Region 5 will look into this and get back to MDEQ with an answer. All acknowledged that if Flint initiated corrosion control treatment and continued to evaluate the system to ensure optimization that these efforts would essentially equate to a corrosion control study.
- The Region raised its concern about looking at treatment more comprehensively to ensure problems with DBPs didn't occur. MDEQ stated that Flint is on the brink of DBP compliance and that bacteriological issues haven't occurred since last year. Any adjustments for corrosion control treatment would need to make sure the other issues weren't exacerbated.
- Region 5 again offered the assistance of ORD staff, Darren Lytle and Mike Schock which MDEQ said they had shared with Flint already.

Issue #2: Discuss optimal corrosion control requirements

Discussion Items:

- MDEQ explained that they did not treat the switch to Flint River water as a "new system", but as a new source. It is their understanding that 2 rounds of 6-month monitoring is still needed to characterize the water quality. They don't know what is optimized until those 2 rounds of 6-month monitoring are completed.

- Region 5 noted that under 141.81(b)(3)(iii) that any system that has been deemed optimized must notify the State of any long-term change in treatment or the addition of a new source. The State must review and approve the change and may require any such system to conduct additional monitoring or other action to ensure that the system maintains minimal levels of corrosion in the distribution system. The State's requirement for 2 additional rounds of 6-month monitoring would fall under the "additional monitoring" prescribed by the State and not the initial 2 rounds of 6-month monitoring for new systems.
- Region 5 explained that they have talked to HQ about the interpretation of regulations and believes that systems that have been deemed optimized need to "maintain" corrosion control. The Region agreed to provide supporting regulatory citations for the language about maintaining corrosion control. Ed Moriarty in OGWDW is also consulting OGC on this topic and the OGC opinion will also be shared.
- MDEQ mentioned that there are other communities that may leave the Detroit system or connect to the new Lake Huron pipeline, but many of those either don't need to treat for corrosion control or will be building new treatment plants. Requirements for maintaining corrosion control for additional communities connecting to the Lake Huron pipeline will be discussed further after receipt of the HQ/OGC opinion.

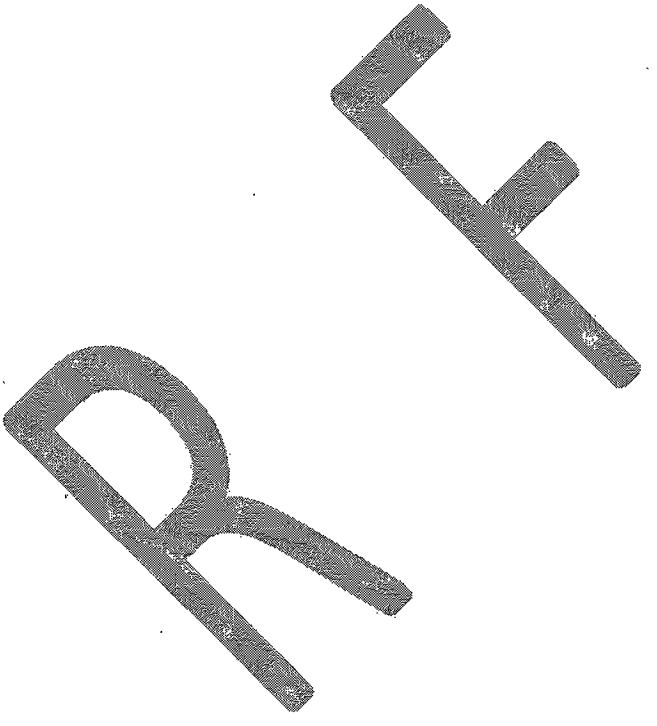
Issue #3: Discuss Pre-flushing (as time allows)

- Lead compliance sampling procedures in the state of Michigan comply with Federal SDWA requirements which calls for a minimum of 6 hours during which there is no water used from the tap the sample is taken from.
- MDEQ is not interested in changing its position on pre-flushing until new regulations come out. They also pointed out that the pre-flushing instructions are not requirements, but suggestions.
- The Michigan pre-flushing instructions were developed as a way to ensure that sampled faucets were not stagnant for an excessive period of time beyond the targeted 6 hour (i.e., rarely used faucets or when a homeowner has been gone for an extended period of time).

Next Steps:

- **MDEQ will send a letter to Flint regarding the 2 rounds of 6-month monitoring results that exceed 5 ppb and the need for a corrosion control study. They will have discussions with Flint to request that they start corrosion control treatment as soon as possible rather than waiting for the completion of a study that can take 18 months.**
- **MDEQ and the Region were in agreement that it is important to get phosphate addition going in Flint as soon as possible. MDEQ mentioned tapping Mike Shock for help with this in the interim.**
- **Region 5 commented that we now have a path forward for Flint despite a difference of opinion on whether the regulations required Flint to "maintain" corrosion control treatment when they started serving treated water from the Flint River.**
- **MDEQ and Region 5 agreed that after Flint implements corrosion control treatment, when they switch back to Lake Huron water, they will need to continue the corrosion control treatment while conducting monitoring to determine if this treatment is optimized with the new Lake Huron water quality.**

- **Region 5 will get back to MDEQ once it gets HQ/OGC's opinion on the need to "maintain" corrosion control treatment once a system is deemed optimized.**
- **MDEQ and Region 5 agreed that other communities currently implementing corrosion control treatment and change sources will need to continue to provide corrosion control treatment and conduct monitoring to determine whether the treatment is optimized with the new source water quality.**
- **Region 5 will research and get back to MDEQ on the 141.81 (3)(b)(5) citation and the ability to waive a CCT study.**



Shekter Smith, Liane (DEQ)

From: Benzie, Richard (DEQ)
Sent: Wednesday, September 09, 2015 6:36 PM
To: Wurfel, Brad (DEQ); Busch, Stephen (DEQ); Shekter Smith, Liane (DEQ); Prysby, Mike (DEQ)
Cc: Cook, Pat (DEQ)
Subject: RE: june 24 memorandum

Sorry this reply is so long. I didn't plan to do so, but I wanted to provide you with some information in case you feel the need to reply in part today.

Brad,

Mike Prysby is on annual leave for a couple of weeks, Steve Busch was in his Jackson office today and probably on his way home now, Liane took this afternoon off to attend to personal business in Marshall, and Pat Cook is gone for the day. Do you need an answer today?

Since this memo is based on the unofficial draft report, do we want to comment? We should probably meet to discuss before anyone responds.

As you know, we have agreed to disagree with EPA on a couple of the issues raised by this memo covering an unofficial EPA report.

To begin, when the lead and copper rules (LCR) were first implemented, large systems were allowed to collect two sets of lead and copper samples in consecutive 6 month monitoring periods and if their 90th percentile lead level was within 5 milligrams per liter of the lead level in their source water, they did not have to further "optimize" corrosion control treatment. When Flint changed water sources from the Great Lakes to an inland river and employed water treatment that was significantly different (precipitative softening vs. direct filtration) than that supplied by Detroit, we granted Flint as a "new supply" the same consideration to determine if their treatment already provided optimal corrosion control.

As you know, their first 6 month monitoring results complied with the Action Level for lead and were close to demonstrating optimal corrosion control treatment (OCCT). Since the city would be averaging results from the two consecutive monitoring periods for the purposes of OCCT determination, we awaited their second set of results to see what they would reveal. After getting the second set, it was determined that Flint was again in compliance with the lead and copper Action Level but they did not qualify as already practicing OCCT.

Under the original regulatory schedule for implementing OCCT, a community serving more than 50,000 people was given a year to conduct treatment studies and submit them to DEQ. We then have 6 months to review their studies and designate their OCCT. They then have 2 years to install that treatment. During all that time, no monitoring is required. Our response to the concerns raised in that memo but also more significantly, in formal discussions with Region 5 EPA Managers, was to encourage Flint to not take the time we believe they were entitled to have for this process but to move as quickly as possible to implement some OCCT.

Second, we continue to disagree with EPA on sampling protocols. We have attempted to ensure compliance with EPA guidance (I believe it was provided in the preamble to their lead and copper regulations) that said that household use should be "typical" for a residential customer on the day before sample collection for lead and copper. Early in the implementation of the LCR, we had encountered too many situations where compliance samples had been collected from kitchen and bathroom taps that had not been used in days and in some cases, even weeks, resulting in excessively stagnated water and correspondingly high lead levels that did not represent typical exposure expected after overnight stagnation. Further complicating this issue was the media spectacle that was arising over EPA's direct implementation of the LCR in Washington, D.C.,

where lead results were not always being included in compliance calculations and subsequently, invalidation of samples was becoming more difficult. In order to avoid that complicated process, we devised our current recommendations for ensuring appropriate but not excessive stagnation for LCR monitoring.

We continue to believe it is appropriate to flush these taps the day before sample collection to simulate and/or ensure typical household use before the tap is allowed to sit overnight to achieve the expected stagnation time the regulation stipulates (~8 hours) prior to collecting the first draw sample. The LCR does not say the result should represent the "absolute worst case" condition – it talks about sampling the highest risk locations (lead plumbing, lead service lines, high lead content solder piping, etc.) after overnight stagnation and then collecting a first draw sample so as not to flush elevated lead from that tap at that point in time. Until EPA changes this rule, we are satisfied with our sampling protocol.

I am leaving now, so you can use this information as you see fit, or wait until tomorrow to discuss with Steve, Liane, Pat and me. We have an all-day ODWMA managers meeting starting at 9 AM Thursday, although Liane is also attending a meeting first thing in the morning with Jim Sygo, Bob Wagner and Jon Allen.

Richard

From: Wurfel, Brad (DEQ)
Sent: Wednesday, September 09, 2015 4:52 PM
To: Busch, Stephen (DEQ); Benzie, Richard (DEQ); Shekter Smith, Liane (DEQ); Prysby, Mike (DEQ)
Subject: FW: june 24 memorandum

Heads up
b

From: Ronald Fonger [mailto:RFONGER1@mlive.com]
Sent: Wednesday, September 09, 2015 1:28 PM
To: Wurfel, Brad (DEQ)
Subject: june 24 memorandum

Brad:
I know you said the state would not comment on unofficial draft reports from U.S. EPA staff, but since the attached June 24 memorandum was sent to four DEQ staff members, can you comment about what – if anything – the state has done in response?
Was the city of Flint notified of the issues raised in the memorandum directly by DEQ?
Was there a written response from DEQ to U.S. EPA to the memo?
Thanks, we are looking further into some of the issues raised in this document.

Ron Fonger
MLive Media Group
Reporter

mobile PPI
email rfonger1@mlive.com
address 540 S. Saginaw St. #101, Flint MI 48502

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

WG-15J

June 24, 2015

MEMORANDUM

SUBJECT: High Lead Levels in Flint, Michigan – Interim Report

FROM: Miguel A. Del Toral
Regulations Manager, Ground Water and Drinking Water Branch

TO: Thomas Poy
Chief, Ground Water and Drinking Water Branch

The purpose of this interim report is to summarize the available information regarding activities conducted to date in response to high lead levels in drinking water reported by a resident in the City of Flint, Michigan. The final report will be submitted once additional analyses have been completed on pipe and water samples.

Following a change in the water source, the City of Flint has experienced a number of water quality issues resulting in violations of National Primary Drinking Water Regulations (NPDWR) including acute and non-acute Coliform Maximum Contaminant Level (MCL) violations and Total Trihalomethanes (TTHM) MCL violations as follows:

Acute Coliform MCL violation in August 2014
Monthly Coliform MCL violation in August 2014
Monthly Coliform MCL violation in September 2014
Average TTHM MCL violation in December 2014
Average TTHM MCL violation in June 2015

In addition, as of April 30, 2014, when the City of Flint switched from purchasing finished water from the City of Detroit to using the Flint River as their new water source, the City of Flint is no longer providing corrosion control treatment for lead and copper.

A major concern from a public health standpoint is the absence of corrosion control treatment in the City of Flint for mitigating lead and copper levels in the drinking water. Recent drinking water sample results indicate the presence of high lead results

in the drinking water, which is to be expected in a public water system that is not providing corrosion control treatment. The lack of any mitigating treatment for lead is of serious concern for residents that live in homes with lead service lines or partial lead service lines, which are common throughout the City of Flint.

In addition, following the switch to using the Flint River, the City of Flint began adding ferric chloride, a coagulant used to improve the removal of organic matter, as part of the strategy to reduce the TTHM levels. Studies have shown that an increase in the chloride-to-sulfate mass ratio in the water can adversely affect lead levels by increasing the galvanic corrosion of lead in the plumbing network.

Prior to April 30, 2014, the City of Flint purchased finished water from the City of Detroit which contained orthophosphate, a treatment chemical used to control lead and copper levels in the drinking water. When the City of Flint switched to the Flint River as their water source on April 30, 2014, the orthophosphate treatment for lead and copper control was not continued. In effect, the City of Flint stopped providing treatment used to mitigate lead and copper levels in the water. In accordance with the Lead and Copper Rule (LCR), all large systems (serving greater than 50,000 persons) are required to install and maintain corrosion control treatment for lead and copper. In the absence of any corrosion control treatment, lead levels in drinking water can be expected to increase.

The lack of mitigating treatment is especially concerning as the high lead levels will likely not be reflected in the City of Flint's compliance samples due to the sampling procedures used by the City of Flint for collecting compliance samples. The instructions from the City of Flint to residents direct the residents to 'pre-flush' the taps prior to collecting the compliance samples. A copy of the instructions provided by the City of Flint to residents will be included in the final report.

The practice of pre-flushing before collecting compliance samples has been shown to result in the minimization of lead capture and significant underestimation of lead levels in the drinking water. Although this practice is not specifically prohibited by the LCR, it negates the intent of the rule to collect compliance samples under 'worst-case' conditions, which is necessary for statistical validity given the small number of samples collected for lead and copper under the LCR. This is a serious concern as the compliance sampling results which are reported by the City of Flint to residents could provide a false sense of security to the residents of Flint regarding lead levels in the water and may result in residents not taking necessary precautions to protect their families from lead in the drinking water. Our concern regarding the inclusion of 'pre-flushing' in sampling instructions used by public water systems in Michigan has been raised with the Michigan Department of Environmental Quality (MDEQ). The MDEQ has indicated that this practice is not prohibited by the LCR and continues to retain the 'pre-flushing' recommendation in their lead compliance sampling guidance to public water systems in Michigan. A copy of the MDEQ guidance will be included in the final report.

In the case of the Flint resident that contacted U.S. EPA (Ms. Lee-Anne Walters), the initial results from drinking water samples collected by the City of Flint in her home

for lead were 104 ug/L and 397 ug/L. The level of iron in the water also exceeded the capability of the measurement (>3.3 mg/L). The lead results were especially alarming given that the samples were collected using the sampling procedures described above, which minimize the capture of lead. When contacted by U.S. EPA Region 5, the MDEQ indicated that the lead was coming from the Walters' plumbing. Ms. Walters had previously indicated that all of the plumbing in the home was plastic.

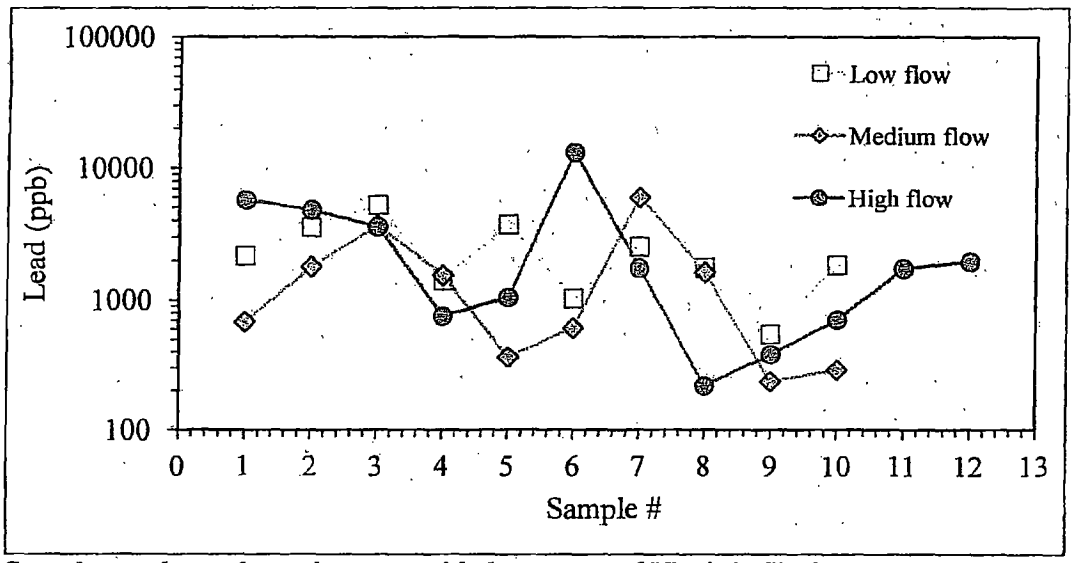
Following the confirmation of the initial high lead results, U.S. EPA Region 5 conducted two visits to the Walters' home on April 27, 2015 and May 6, 2015. Based on an inspection of the plumbing and subsequent sampling conducted at the Walters' residence, it was determined that except for a few minor metallic connectors, all interior plumbing, including the pipes, valves and connectors are made of plastic certified by the National Sanitation Foundation (NSF) for use in drinking water applications. Subsequent sampling showed that the faucets in the home appear to be compliant with the new lead-free requirements and are also not the source for the high lead levels. Our inspection of the interior plumbing and analysis of follow-up sampling results demonstrate that the home plumbing network is not the source of the high lead levels found at the Walters' residence. The photographs and all sampling results will be included in the final report.

Based on the U.S. EPA inspection and documentation of the plastic plumbing at the Walters' residence, it was suspected that the high lead was being introduced into the Walters' home plumbing from outside the home, likely from a lead service line. Three portions of the service line were extracted during a subsequent trip on May 6, 2015 and sent for analysis, when the Walters' service line was replaced. Analyses performed to date indicate that a portion of the service line is made of galvanized iron pipe. Inspection of the remaining portion from the water main to the external shut-off valve confirmed that the portion from the water main to the external shut-off valve is a lead service line.

Ms. Walters has also provided U.S. EPA with medical reports on her child's blood lead testing indicating that the child had a low blood lead level (2 ug/dL) prior to the source water switch and an elevated blood lead level following the switch (6.5 ug/dL). Redacted copies of these reports will also be included in the final report.

Subsequent to the discovery of high lead levels in the Walters' drinking water, the water to the Walters' home was shut off on April 3, 2015. The water was briefly turned back on to collect additional samples on April 28, 2015. Since the water had stagnated for an extended period of time, the kitchen tap was flushed for 25 minutes the night before collecting the samples. Three sets of samples were collected at different flow rates (10 at low flow, 10 at medium flow and 10 at high flow).

The drinking water samples collected from the Walters' residence on April 28, 2015 contained extremely high lead levels, ranging in value from 200 ug/L to 13,200 ug/L (see below).



Sample results and graph are provided courtesy of Virginia Tech

Additional sample results from resident-requested samples have also shown lead levels in excess of the lead action level. As with the samples collected by the City of Flint for compliance, the resident-requested samples are also being collected using the 'pre-flushing', so the lead levels captured in these samples likely do not represent the worst-case lead levels in the water and the actual lead levels at these homes may be much higher.

Pending completion of the final report, my interim recommendations are as follows:

1. The U.S. EPA should follow up with the MDEQ and the City of Flint on the recommendation made by U.S. EPA to MDEQ on June 10, 2015 to offer the City of Flint technical assistance on managing the different water quality issues in Flint, including lead in the drinking water. Although there have been two written assessments regarding water quality and operational issues in Flint at the time of this report, they do not address lead in drinking water. The first is an Operational Evaluation Report (OER) produced in November 2014 by Lockwood, Andrews and Newnam, Inc. to assess the factors contributing to high Total Trihalomethane (TTHM) levels in Flint following the source change. The focus of this report is to identify potential causes and remedial actions for lowering TTHM levels. The second report (Water Quality Report) produced by Veolia for the City of Flint on March 12, 2015, is an assessment of Flint's water quality and operations which provides advice to the City of Flint primarily focused on TTHM control and other operational issues. Both reports were written prior to the recent discovery of high lead results in Flint drinking water. As such, the reports do not take into account the potential effects on lead levels in drinking water.

As previously mentioned, the City of Flint currently has no mitigating treatment for lead and is also planning another source water change in the near future. U.S. EPA's Office of Research and Development in Cincinnati has extensive experience in corrosion and corrosion control treatment and distribution system issues and would be a valuable addition to the drinking water advisory group for the City of Flint. Copies of the qualifications and experience for Michael Schock and Darren Lytle have been forwarded to MDEQ.

2. U.S. EPA should review the compliance status of the City of Flint with respect to whether the system is in violation of the LCR requirement to install and maintain optimal corrosion control and whether the MDEQ is properly implementing the LCR provisions regarding optimal corrosion control treatment requirements for large systems. Pursuant to 40 CFR Section 141.82(i), the EPA Regional Administrator may review treatment determinations made by a State and issue federal treatment determinations consistent with the requirements of the LCR where the Regional Administrator finds: (1) A state has failed to issue a treatment determination by the applicable deadlines; (2) A State has abused its discretion in a substantial number of cases or in cases affecting a substantial population; or (3) The technical aspects of a State's determination would be indefensible in an expected Federal enforcement action taken against a system.

3. The U.S. EPA should review whether relevant resident-requested samples are being included by the City of Flint in calculating the 90th percentile compliance value for lead. Recent drinking water tests conducted at homes in Flint for lead that are not part of the compliance sampling pool have revealed high lead levels in the drinking water. The U.S. EPA memorandum signed on December 23, 2004 provides clarification on compliance determinations and states that customer-requested samples are to be included in the 90th percentile lead compliance calculation where the sampling is conducted during the monitoring period from sites and sampling procedures meeting the LCR criteria. Given the prevalence of lead service lines in the City of Flint, should these sample results be from homes with lead service lines, the sample results would be considered compliance samples under the LCR.

Also attached is a timeline of events for Flint, Michigan. Should you have any questions regarding the information or recommendations provided, please let me know.

cc: Liane Shekter-Smith (MDEQ)
Pat Cook (MDEQ)
Stephen Busch (MDEQ)
Michael Prysby (MDEQ)
Marc Edwards (Virginia Tech)
Michael Schock, EPA-ORD
Darren Lytle, EPA-ORD

Shekter Smith, Liane (DEQ)

From: Crooks, Jennifer <crooks.jennifer@epa.gov>
Sent: Monday, August 31, 2015 2:35 PM
To: Shekter Smith, Liane (DEQ); Benzie, Richard (DEQ); Busch, Stephen (DEQ)
Subject: FW: links to update flint water news

Importance: High

Today's updates on Marc Edwards' site. His staff is phone calling and emailing results to citizens. Talk at 2.

From: Porter, Andrea
Sent: Monday, August 31, 2015 1:19 PM
To: Poy, Thomas
Cc: Deltoral, Miguel; Crooks, Jennifer; Shoven, Heather
Subject: links to update flint water news

Hi All,

Today, activists delivered a petition (with ~27,000 signatures) asking Flint to immediately switch back to Detroit water: http://www.abc12.com/news/headlines/Crowd-gathers-outside-Flint-City-Hall-demands-switch-to-Detroit-water--323442421.html

And, in case you haven't checked the Marc Edwards Flint site today, there are more Pb results posted: https://flintwaterstudyupdates.wordpress.com/

"Analysis of water samples from an additional 72 Flint homes are concerning
August 31, 2015 flintwaterstudy Articles

Over the weekend, we analyzed another 72 lead samples collected by Flint residents and mailed to Virginia Tech. For the 120 samples analyzed to date, forty two percent were over 5 ppb, which suggests a serious lead in water problem according to our experience and criteria.

Twenty-three (20% of the 120 samples collected to date) also exceeded the 15 ppb lead action limit. The highest lead sampled in first draw so far was 158 ppb, and the highest sample after 45 second flushing is 1,051 ppb. Six of 120 homes sampled (5%), had over 15 ppb lead even after 2 minutes of continuous flushing.

The 90%'ile lead level in the Flint Water Study is currently 30 ppb, which is double the EPA standard applied to homes with "worst case" lead plumbing, and in a range where water consumption has caused lead poisoning in children and adverse pregnancy outcomes. Needless to say, these data are very worrisome, especially considering that our survey did not target "worst case" lead plumbing systems as is required for EPA sampling.

Look at our summary page here for more details. We just heard that we are approaching the 250 (out of 300) mark of returned kits and we couldn't be more grateful and proud of Flint's citizen scientists. Please continue collecting samples, as larger number of samples helps to draw stronger conclusions. More samples may also help Flint residents understand what regions of the city and the types of plumbing systems that have the most serious lead problems. We are also contacting homes with high lead levels via phone and email and all sampled residents will receive their results via regular mail."

There's also this part about how residents with high results in the first round were called:
"Informing Flint Residents about lead in their water

All Flint residents who returned their lead kits will receive their results via regular mail. You will also receive this document on how to interpret your lead results. For the first 48 lead kits analyzed so far, we have finished calling residents who had considerably high lead in their water. For those we couldn't get through, we left voicemail messages and sent an email."

Thanks,
Andrea Porter

Environmental Engineer
Ground Water & Drinking Water Branch
U.S. EPA, Region 5 (WG-15J)
77 W. Jackson Blvd.
Chicago, IL 60604
Phone: 312-886-4427
Fax: 312-697-2656

Up-to-date information on our collaborative research and citizen science work with the residents of Flint, MI in light of reported water quality issues

Analysis of water samples from an additional 72 Flint homes are concerning (https://flintwaterstudyupdates.wordpress.com/2015/08/31/analysis-of-water-samples-from-an-additional-72-flint-homes-are-concerning-as-well/)

__ August 31, 2015August 31, 2015 __ flintwaterstudy __ Articles

Over the weekend, we analyzed another 72 lead samples collected by Flint residents and mailed to Virginia Tech. For the 120 samples analyzed to date, **forty two percent were over 5 ppb**, which suggests a serious lead in water problem according to our experience and criteria.

Twenty-three (20% of the 120 samples collected to date) also exceeded the 15 ppb lead action limit. The highest lead sampled in first draw so far was 158 ppb, and the highest sample after 45 second flushing is 1,051 ppb. Six of 120 homes sampled (5%), had over 15 ppb lead even after 2 minutes of continuous flushing.

The 90%'ile lead level in the Flint Water Study is currently **30 ppb, which is double the EPA standard applied to homes with "worst case" lead plumbing, and in a range where water consumption has caused lead poisoning in children and adverse pregnancy outcomes.** Needless to say, these data are very worrisome, especially considering that our survey did not target "worst case" lead plumbing systems as is required for EPA sampling.

Look at our summary page here (https://flintwaterstudyupdates.wordpress.com/information-for-flint-residents/results-for-citizen-testing-for-lead-300-kits/) for more details. We just heard that we are approaching the 250 (out of 300) mark of returned kits and we couldn't be more grateful and proud of Flint's citizen scientists. **Please continue collecting samples, as larger number of samples helps to draw stronger conclusions.** More samples may also help Flint residents understand what regions of the city and the types of plumbing systems that have the most serious lead problems. We are also contacting homes with high lead levels via phone and email and all sampled residents will receive their results via regular mail.



(https://flintwaterstudyupdates.wordpress.com/2015/08/31/analysis-of-water-samples-from-an-additional-72-flint-homes-are-concerning-as-well/img_6919/#main)



(https://flintwaterstudyupdates.wordpress.com/2015/08/31/analysis-of-water-samples-from-an-additional-72-flint-homes-are-concerning-as-well/img_6930/#main)



(https://flintwaterstudyupdates.wordpress.com/2015/08/31/analysis-of-water-samples-from-an-additional-72-flint-homes-are-concerning-as-well/img_6898/#main)



(https://flintwaterstudyupdates.wordpress.com/2015/08/31/analysis-of-water-samples-from-an-additional-72-flint-homes-are-concerning-as-well/img_6916/#main)



(https://flintwaterstudyupdates.wordpress.com/2015/08/31/analysis-of-water-samples-from-an-additional-72-flint-homes-are-concerning-as-well/img_6905/#main)



(https://flintwaterstudyupdates.wordpress.com/2015/08/31/analysis-of-water-samples-from-an-additional-72-flint-homes-are-concerning-as-well/img_6900/#main)

Our team (including Anurag Mantha, not pictured) hard at work towards analyzing the 72 lead kits (216 samples) over the weekend

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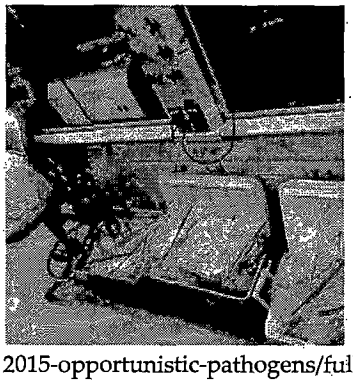
Results from Field Sampling in Flint (Aug 17-19 2015) : Opportunistic Pathogens (https://flintwaterstudyupdates.wordpress.com/2015/08/29/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens/)

__ August 29, 2015August 29, 2015 __ flintwaterstudy __ Articles

Report 3. Opportunistic Pathogens: Legionella pneumophila and Mycobacterium avium.

During our recent sampling trip to Flint, we found that all of our samples sites were free of fecal indicator bacteria but that many sites lacked a chlorine residual, which is a critical barrier for preventing regrowth of bacteria in pipes (https://flintwaterstudyupdates.wordpress.com/2015/08/25/research-results-for-field-sampling-in-flint-august-17-19-2015/). Our research team has further observed in previous work that opportunistic pathogens (https://flintwaterstudyupdates.wordpress.com/2015/08/23/opportunistic-pathogens/) tend to grow in distribution system and home plumbing pipes when there is a lack of chlorine residual. Thus, it is worrisome that recent reports in Genesee County indicate a possible increase in cases of Legionnaire's Disease, a respiratory infection caused by an opportunistic pathogen (*Legionella pneumophila*). (http://www.detroitnews.com/story/news/nation/2015/08/04/seven-died-legionnaires-disease-new-york/31108771/)

During our trip, we collected samples from **nine businesses located throughout the city of Flint,** including eight of Flint's designated monitoring sites and a business located in close proximity to the drinking water treatment plant, and **seven homes of Flint water consumers.** For comparison, we also collected water from **four businesses that receive water from Detroit.** At each of these sites we collected *both water samples and swabs of bacteria growing on the surface within the faucet,* known as the **biofilm.**



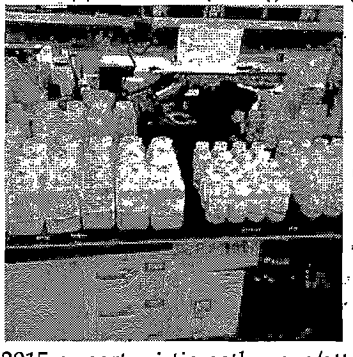
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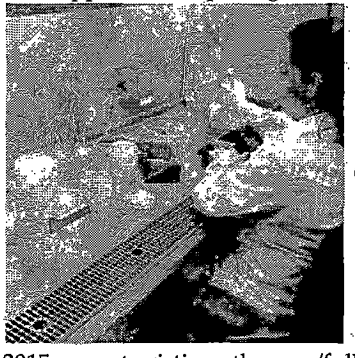
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(https://flintwaterstudyupdates.wordpress.com/2015/08/29/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens/img_1043/#main)



(https://flintwaterstudyupdates.wordpress.com/2015/08/29/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens/attachment/88/#main)



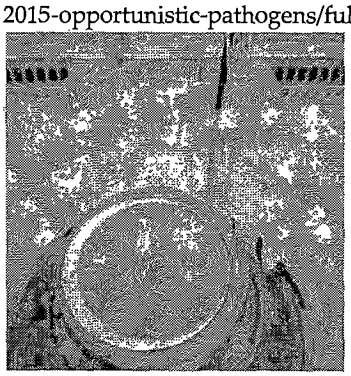
(https://flintwaterstudyupdates.wordpress.com/2015/08/29/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens/fullsizerender/#main)



(https://flintwaterstudyupdates.wordpress.com/2015/08/29/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens/fullsizerender3/#main)



(https://flintwaterstudyupdates.wordpress.com/2015/08/29/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens/fullsizerender4/#main)



(https://flintwaterstudyupdates.wordpress.com/2015/08/29/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens/fullsizerender6/#main)



(https://flintwaterstudyupdates.wordpress.com/2015/08/29/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens/fullsizerender77/#main)

From these samples, we investigated the presence of two key opportunistic pathogens which are important to public health: *Legionella pneumophila* and *Mycobacterium avium*. We also measured the presence of a DNA marker (http://www.thefreedictionary.com/DNA+marker) specific to all bacteria within the *Legionella* genus. This *Legionella* genus is a category of bacteria which includes several pathogenic (e.g. *Legionella pneumophila*) and several non-pathogenic species.

Results: We did not detect quantifiable levels of *Legionella pneumophila* or *Mycobacterium avium* in water or biofilm samples collected from any of the sixteen sites in Flint or in any of the four sites receiving Detroit water.

We detected bacteria belonging to the *Legionella* genus in water collected from two of the nine businesses/monitoring sites and in five of seven citizen homes. *Legionella* genus was not detected in any of the four samples collected from sites receiving Detroit water.

Conclusion: We found **no evidence** of *Legionella pneumophila* or *Mycobacterium avium* present at the time of sampling at the sites tested. However, we hypothesize that the presence of bacteria belonging to the *Legionella* genus may be indicative of conditions in the distribution system or in the plumbing of tested homes that may be favorable to the growth of the pathogenic species, *Legionella pneumophila*. In particular, the chronically low levels of a chlorine residual in many parts of the distribution system are likely to increase the risk of opportunistic pathogen colonization.

Additional Notes: The method we used to quantify these pathogens is called quantitative polymerase chain reaction (or qPCR). It works by detecting DNA specific to the target microorganisms, making the method very specific, but also very sensitive, as an organism does not necessarily need to be alive or culturable for us to identify that it is present. The minimum threshold of target bacteria, or more accurately the bacteria's DNA that must be present in the 1-liter samples that we collected is 10 DNA copies per mL or 10^4 copies in the entire swabbed biofilm. This is the best available and most sensitive method of *Legionella* detection.

Sample analyses and write-up: Emily Garner

Acknowledgements: Dr. Marc Edwards and Dr. Amy Pruden

Leave a comment

Analysis of water samples from 48 Flint homes to date for lead are worrisome (https://flintwaterstudyupdates.wordpress.com/2015/08/27/analysis-of-water-samples-from-48-flint-homes-to-date-for-lead-are-worrisome/)

__ August 27, 2015 __ flintwaterstudy __ Articles

Of the first 48 first draw samples collected by Flint residents and analyzed at VT, **52% were over 5 ppb**, which suggests a serious lead in water problem according to our experience and criteria. Fourteen samples (30% of those collected) also exceeded 15 ppb lead, suggesting a very serious lead in water problem. **That is, the Flint Citizen Science study to date, is finding results worse than the EPA standard which is applied to sampling "worst case" homes.** The highest lead sampled in first draw so far was 139 ppb. **The 90th percentile lead level is currently 31 ppb, which is double the EPA standard, and in a range where water consumption can cause lead poisoning in children.**



A sampling bottle from Flint even had particles in them

Look at our summary page here (https://flintwaterstudyupdates.wordpress.com/information-for-flint-residents/results-for-citizen-testing-for-lead-300-kits/) for more details. We will be relaying our findings to residents in homes with high lead levels in the next few days. **We also urge citizens to continue sampling because higher number of samples will allow us to provide even more robust conclusions.**

__ Leave a comment

Research Results for Field Sampling in Flint – August 17-19 2015 (https://flintwaterstudyupdates.wordpress.com/2015/08/25/research-results-for-field-sampling-in-flint-august-17-19-2015/)

__ August 25, 2015August 25, 2015 __ flintwaterstudy __ Articles

Last week, our team visited Flint to conduct extensive field sampling (Aug 17-19, 2015) and evaluate several water quality parameters at different sites within and outside the city (on Detroit water, for comparison). We will post a separate article on trip specifics and our experiences, but here are some preliminary results on what we know so far.

Report 1. Good News. Fecal Indicator Bacteria in Flint.

The most important goal of drinking water treatment is to make sure that fecal bacteria and viruses are removed or destroyed at the water treatment plant. We tested 18 samples collected from around the City of Flint, including 6 from consumer's homes. We had the samples analyzed by the City. Importantly, we also submitted a POSITIVE CONTROL SAMPLE with high levels of fecal bacteria, labeled like every other sample we submitted. This sample let us know if the city's testing could correctly tell us that a badly contaminated sample, was in fact, contaminated. This is a common approach used by researchers, to be sure that a test is working as expected, and that results are trustworthy.

Results: The River had detectable levels of fecal bacteria as is expected, but none of the samples collected from the Flint distribution system had any detection. The city also correctly reported that the POSITIVE CONTROL SAMPLE had high levels of fecal bacteria.

Conclusions: It appears that the treatment plant is achieving their most important goal, and that the city tests are accurate.

Report 2. Bad News. Chlorine measurements in Flint.

To keep the water safe as it is transported to consumer's homes, it is necessary to maintain a Cl_2 level of 0.2 mg/L or higher throughout the distribution system. In Flint, the *Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 2012 Edition, Recommended Standards for Waterworks (Ten States Standards)* says that:

- Minimum free chlorine residual in a water distribution system should be 0.2 mg/L.
- Higher residuals may be required depending on pH, temperature and other characteristics of the water.

Results: While we were in Flint, we sampled a total of 17 locations for free chlorine in flushed cold water. Of those 17 samples, 7 samples (41%) did not have any detectable chlorine at all. At one location, Dr. Edwards flushed the tap for 8 hours and never obtained any detectable chlorine. This confirms our concern, that it might not be possible to treat the water to meet existing Federal standards given the high corrosivity of Flint water. In other words, no matter how good the people at the Flint treatment plant are at their jobs, it is possible that Flint residents cannot receive the minimum quality of water mandated by Federal regulations. We will be posting more on this problem in the future.

For comparison, we also took samples of water from a nearby city still using Detroit water, and 4 out of 4 had chlorine levels of 0.2 mg/L or higher. Significantly, these were also collected from hot water samples, which tend to have much lower chlorine than cold water.

Conclusions: It seems very hard to believe that standards for free chlorine residual were being met in the Flint distribution system from August 17-19, 2015.

Primary Author: Dr. Marc Edwards

__ 1 Comment

Why is it possible that Flint River water cannot be treated to meet Federal Standards? (https://flintwaterstudyupdates.wordpress.com/2015/08/24/why-is-it-possible-that-flint-river-water-cannot-be-treated-to-meet-federal-standards/)

__ August 24, 2015August 25, 2015 __ flintwaterstudy __ Articles, Research Updates __ comparison tests, detroit water, drinking water, flint water, iron corrosion

The key problem is that water from the Flint River is highly corrosive to iron and lead, and, unfortunately, these pipe materials are widely used throughout Flint. Herein, we discuss the higher corrosivity of Flint River water to iron, and the associated problem maintaining chlorine disinfectant in the system.

Why is Flint River water more corrosive compared to Detroit water? Flint River water has about 8 times more chloride (Cl^-) in it than Detroit water. Chloride is generally considered to be very corrosive to iron. For instance, chloride present in road salts applied in the winter causes iron in cars and bridges to rust. Detroit also adds a corrosion inhibitor chemical (orthophosphate) to their water that helps to reduce corrosion of metals such as iron and lead. So, current Flint water is not only more corrosive, but there is also no corrosion inhibitor present.

Iron corrosion can cause a serious problem for meeting Federal standards using Flint River Water, because iron corrosion consumes chlorine. Chlorine is added to the water to prevent growth of microorganisms that cause disease, and maintaining a chlorine residual is the best way to protect public health against human pathogens.

To illustrate how iron corrosion is problematic for maintaining a chlorine residual, we collected a sample of Flint water. We put some of that sample into a clean glass container, and some more of it into an identical container with a piece of iron to simulate the effect of water on iron pipes in Flint. We then measured the decay of chlorine over time (Figure 1). The initial level of chlorine was 1.15 milligrams per liter (mg/L), and it stayed pretty high when it was in a glass container. It only dropped to 0.95 mg/L over 12 hours (blue line). Thus, if Flint had a glass (or plastic or concrete) pipe system, chlorine would stay high as it was transported to homes. But when we did the same test with iron present, the chlorine dropped faster due to the corrosion, and was all gone after only 12 hours (red line). After 6 days of doing the test, the chlorine dropped even faster, and was below the minimum required chlorine residual of 0.2 mg/L in just about 1 hour in our test system (green line). ***The key point is that Flint River water is corroding iron pipes, and that will cause the chlorine to disappear very quickly.***

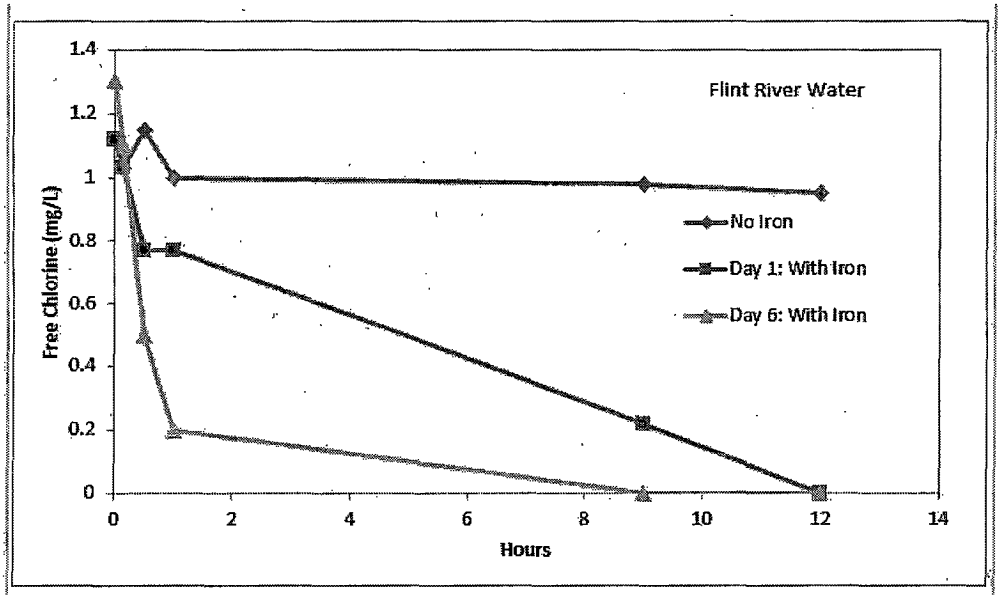


Figure 1: Decaying of free chlorine in Flint River water with and without iron

When we did the exact same test using water from Detroit (collected on the outskirts of Flint), the chlorine in the container without the iron stayed high at about 0.6 mg/L over a 12 hour test (blue line below). When iron was present, chlorine dropped, but much slower than in the Flint River water (red line and green line). Ironically, Detroit water started with only about 60% of the chlorine initially present in Flint water, but ended up with much more chlorine after 12 hours because there was less iron corrosion. What is more, comparing Day 1 to Day 6, Flint water ate up more chlorine the longer the test was run, whereas Detroit water ate up less chlorine the longer the test was run.

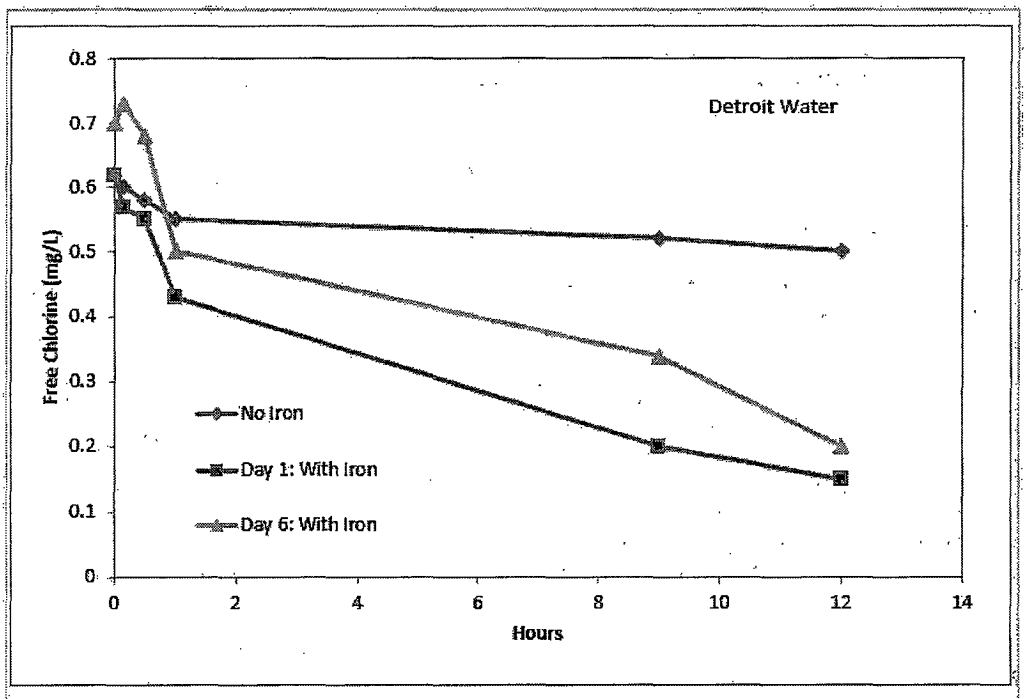
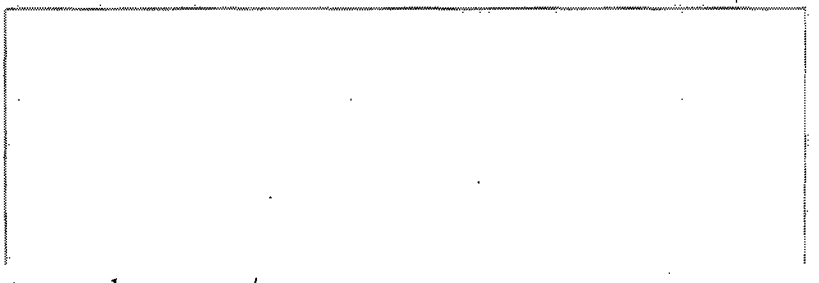


Figure 2: Decaying of free chlorine in Detroit water with and without iron

Figure 3 shows a picture of Flint water and Detroit water after reacting in the glass containers described after the first 5 days of the test. This also illustrates why residents have been complaining of "red" or discolored water after the switch to the Flint River source.



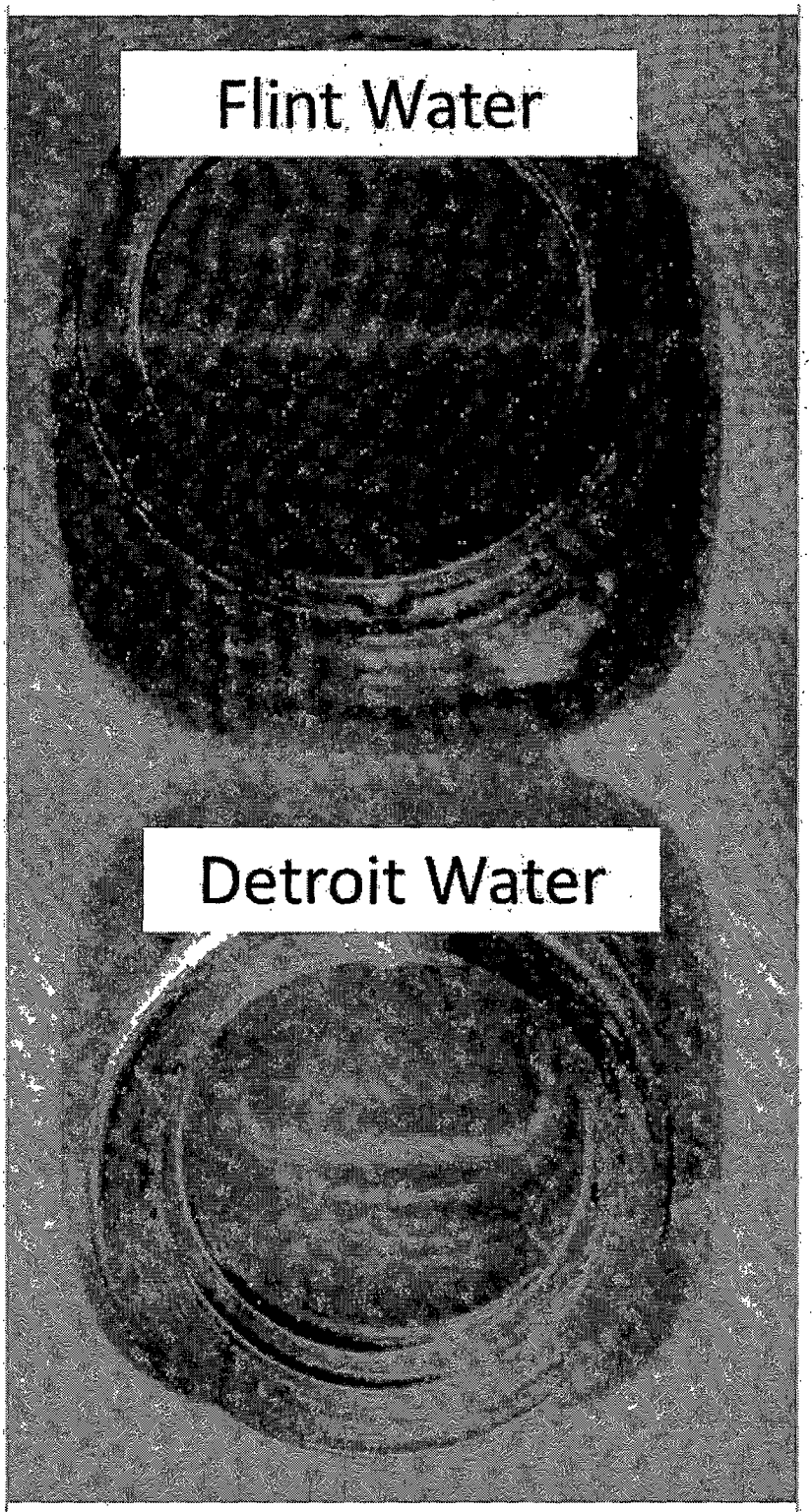


Figure 3: Higher release of iron is evident in the Flint water glass reactor containing iron than that with Detroit water

At present, as a rough estimate which we will elaborate on later, it looks like Detroit water is about 5 times less corrosive to iron pipe than Flint River water. This also probably means that the iron pipes in the city of Flint system will fail 5 times faster using the Flint River water rather than the Detroit water. In fact, this is probably already occurring as evidenced by increased rates of water main leaks and breaks (http://www.mlive.com/news/flint/index.ssf/2012/05/flint_officials_water_leakage.html). While an economic analysis cannot yet be done based on our limited data, it is possible (and even likely) that the economic damage to the Flint pipe system due to corrosion is going to cost the city tens of millions of dollars more in pipe repair costs in the coming years compared to what they would have paid if they had stayed on Detroit water.

Conclusion: The high rates of iron corrosion from using Flint River water as a drinking water source are damaging the Flint distribution system (http://www.mlive.com/news/flint/index.ssf/2015/04/flint_dpw_director_says_water.html). The corrosion is also causing chlorine to disappear quickly, which may make it more likely for harmful bacteria to grow in the water. Furthermore, it is possible that with the existing unlined iron pipe system in Flint, and the relatively low water demand (due to declining population, loss of GM – which used a lot of water – as a water customer, and high rates), that it will very difficult to meet Federal standards for minimum chlorine levels no matter what is done to treat the water.

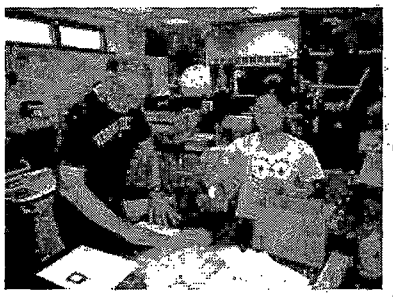
Primary Author: Dr. Marc A. Edwards

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300 Lead Testing Kits Dispatched to Flint from Virginia Tech (https://flintwaterstudyupdates.wordpress.com/2015/08/24/300-lead-testing-kits-dispatched-to-flint-from-virginia-tech/)

__ August 24, 2015August 24, 2015 __ flintwaterstudy __ Articles, Research Updates

Students and scientists (see About Us (https://flintwaterstudyupdates.wordpress.com/about-us/)) at Virginia Tech assembled and shipped 300 kits for Flint residents to sample their water and get it analyzed for lead. The kits comprise of three bottles (1L, 500 mL and 250 mL ones) and an instruction sheet (https://goo.gl/Zyp0YY) for sampling tap water. All 300 kits were sent out August 14th (Friday) and reached Flint on August 19th (Wednesday). Here are some pictures of our team assembling the kits.



(https://flintwaterstudyupdates.wordpress.com/2015/08/24/300-lead-testing-kits-dispatched-to-flint-from-virginia-tech/p1060132/#main)



(https://flintwaterstudyupdates:wordpress.com/2015/08/24/300-lead-testing-kits-dispatched-to-flint-from-virginia-tech/p1060141/#main)



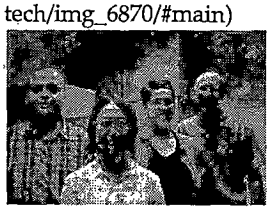
(https://flintwaterstudyupdates.wordpress.com/2015/08/24/300-lead-testing-kits-dispatched-to-flint-from-virginia-tech/p1060146/#main)



(https://flintwaterstudyupdates.wordpress.com/2015/08/24/300-lead-testing-kits-dispatched-to-flint-from-virginia-tech/p1060151/#main)



(https://flintwaterstudyupdates.wordpress.com/2015/08/24/300-lead-testing-kits-dispatched-to-flint-from-virginia-tech/img_6870/#main)



(https://flintwaterstudyupdates.wordpress.com/2015/08/24/300-lead-testing-kits-dispatched-to-flint-from-virginia-tech/img_6866/#main)

The VT group also made an instructional video for water sampling on YouTube to complement the instruction sheet:

Flint's non-profit group Water You Fighting For? (https://www.facebook.com/WaterYouFightingFor/photos/a.808792962547356.1073741832.792641617495824/874347885991863/?__rdr=p&p=10&type=1) is helping coordinate distribution of these kits to volunteering homes and we are expecting the first batch of 25 kits back in the next couple of days. We are grateful to Water You Fighting For? (Melissa Mays and LeeAnne Walters), Laura Sullivan, ACLU of Michigan (Curt Guyette), Democracy Defense League (Claire McClinton and Nayyirah Shariff), Concerned Pastors for Social Action (Alfred Harris Sr.) and all Flint residents for their dedication and drive towards a well-organized sampling effort to maximize identification of potential lead problems in households.

Erin Brockovich's voice of support:

If you don't see a tweet above, go here (https://twitter.com/ErinBrockovich/status/631979253123317760).

__ Leave a comment

Hazardous Waste-levels of Lead found in a Flint household's water (https://flintwaterstudyupdates.wordpress.com/2015/08/24/hazardous-waste-levels-of-lead-found-in-a-flint-households-water/)

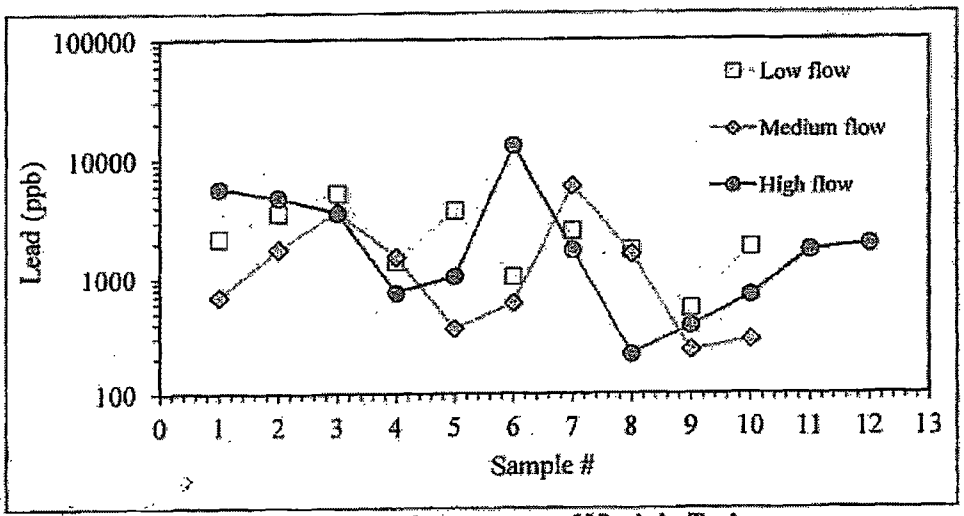
__ August 24, 2015August 24, 2015 __ flintwaterstudy __ Uncategorized

LeeAnne Walters had children with health problems that she was concerned might be linked to the poor water in her home. The water in her home was very brown, even after it was passed through a filtered designed to remove particles. The City of Flint tested her water in March 2015 and found (http://www.deadlinedetroit.com/articles/12697/scary_leaded_water_and_one_flint_family_s_toxic_nightmare#.VbLvmvlViko) 104 parts per billion (ppb), and tested it again and found 397 ppb lead. Even more worrisome is that these high lead levels came after using sampling techniques that tend to make lead levels lower in samples that the city collects. These include use of bottles with very tiny opening and preflushing. Pre-flushing is the act of flushing cold water for 3-4 minutes, prior to beginning the required stagnation period of 6+ hours, after which water samples are taken for lead testing. Pre-flushing essentially "pre-cleans" the lead from the plumbing, and also virtually eliminates the likelihood of detecting lead in water that can come from lead pipe. Likewise, use of bottles with tiny openings, forces consumers to collect water at a very low flow rate, which tends to reduce the amount of lead in water compared to normal use.



Figure 1: LeeAnne Walters shows samples taken from her home on January 21 and January 15 this year to Flint's emergency manager Jerry Ambrose during a January 21 forum (Image courtesy: The Daily Mail/AP (http://www.dailymail.co.uk/news/article-2978777/Protests-water-taste-smell-city-breaks-tie-Detroit.html))

Virginia Tech collaborated with Ms. Walters' on a follow-up sampling event. In this case we used bottles that allowed consumers to use water at a normal flow rate. We also collected 30 bottles from her home at low, medium and high flow rates. The drinking water samples all had extremely high lead levels between 200 ppb to 13,200 ppb (Figure 2). Water containing more than 5,000 ppb of lead, exceeds criteria that classifies water as a hazardous waste. The US EPA action level for lead is 15 ppb and the World Health Organization (WHO) maximum lead level is 10 ppb. Thus, the lead levels in Ms.Walters' water were very alarming by any standard.. It is also important to point out that there is NO safe level for lead in water.



Sample results and graph are provided courtesy of Virginia Tech

Figure-2 Results for lead in sequential sampling (1L water samples taken consecutively) at low, medium and high flows — Results range from 200 to 13,200 ppb

When first viewing the results, Dr. Marc Edwards (who assisted Ms. Walters in the sampling) was in disbelief. "I called Dr. Jeff Parks, who is a senior research scientist who ran the samples, and asked him if this could be an error, because we had never seen such sustained high levels of lead in 25 years of work", he said. The samples were re-tested with extra quality assurance/quality control checks, all of which confirmed the astronomical lead levels in Ms. Walters water. Figure 3 shows close-up pictures of rust particles found in Ms. Walters' water.

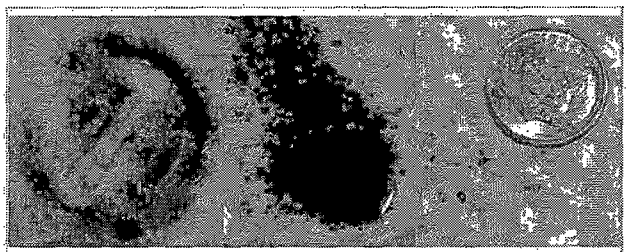


Figure 3: Looking into the bottom of a 1L water sample from Ms. Walters' house (left); close-up of large rust particles (middle and right) — Photograph courtesy Kelsey Pieper and Min Tang

Ms. Walters and her family were not drinking the water, so it was a mystery as to how one of her kids, a four year old, could have been lead poisoned (http://www.aclumich.org/sites/default/files/file/EPAWaterReport062415.pdf), as was evident from blood tests done after the city tested the water and found high lead levels. Their home is otherwise lead free. It is possible that in this unusual case, that the level of lead in the water was so high, that her children did not have to drink it to be exposed. Ingesting the lead indirectly, after washing their hands, showering, bathing or even washing dishes, may have caused the high lead in their blood.

We will be examining the hypothesis of the city officials, that problems with lead over the EPA Action Level are isolated to Ms. Walters' home.

Primary Authors: Anurag Mantha and Siddhartha Roy

Acknowledgements: Dr. Marc Edwards, Dr. Jeffrey Parks

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Shekter Smith, Liane (DEQ)

From: Crooks, Jennifer <crooks.jennifer@epa.gov>
Sent: Thursday, September 03, 2015 2:51 PM
To: Shekter Smith, Liane (DEQ); Benzie, Richard (DEQ); Busch, Stephen (DEQ); Prysby, Mike (DEQ)
Cc: Poy, Thomas; Porter, Andrea
Subject: Draft Notes from call Tuesday with MI DEQ RE: Flint

Importance: High

All—these are the notes I jotted down during our call this past Tuesday when we discussed Flint. Any edits?
Jennifer

Date: August 31, 2015
Present: Liane Shekter Smith, Richard Benzie, Steve Busch, (2 other MDEQ staff?), Tom Poy, Andrea Porter, Janet Kuefler, Jennifer Crooks

STRATEGIC NEXT STEPS FOR FLINT TO ADDRESS LEAD CORROSION CONCERNS

Tom Poy discussed Marc Edwards' website, "Flint, MI Water Study Updates" (https://flintwaterstudyupdates.wordpress.com/). The discussion focused on the lead sampling and analytical results Marc Edwards' team posted to their website. Tom emphasized that EPA is not involved with Marc Edwards' work in Flint. Tom mentioned that the Edwards team's samples may not have been analyzed by a certified lab (which is only required for compliance samples) nor taken from sites that qualify as Tier 1 for LCR compliance sampling, but the results give further evidence that lead levels in Flint are trending upward. (The conclusion that there is an increasing trend of lead concentrations at consumer taps builds upon earlier compliance sampling taken by Flint in 2014 and 2015 that showed the 90th percentile of the 1st 6-month sampling period at 6ppb, then the 90th percentile of the 2nd 6-month sampling period at 11ppb.)

The "Flint, MI Water Study Updates" website is putting added pressure on MDEQ and EPA to ensure that Flint addresses their lack of optimized corrosion control treatment in an expedited manner in order to protect the residents from exposure to high lead levels. Richard noted that there are numerous systems across the country that have installed corrosion control treatment, have optimized their corrosion control, but continue to have high lead levels. We all acknowledged that this is true, but we all also acknowledged that to delay installation of corrosion control treatment in Flint would likely cause even higher levels of lead over time as Flint's approximately 15,000 lead service lines are continuously in contact with corrosive water.

Region 5 and MDEQ brainstormed on strategic next steps for Flint to address lead corrosion concerns. These steps included:

1. **Public Education for Flint Residents.** Liane has contacted the Department of Community Health to discuss developing a consumer lead education piece outlining the consumer's responsibilities to lower the lead in their drinking water. The Region was glad to hear of a plan to initiate Lead Public Education since this will provide the public immediate actions they can take. The educational material could include steps consumers can take immediately to reduce their exposure to lead in drinking water (flushing their lines after long stagnation periods, using filters certified to remove lead, etc.) as well as longer term fixes to remove lead sources (for example, financing the cost to remove any part of a lead service line on the owner's property at the same time as Flint is replacing its portion of the lead service line).

2. **Gathering Information on Flint's Future Treatment Plans.** Steve Busch said Flint and their engineering consultants were meeting this week (Sept 1) to discuss conceptually the necessary optimized corrosion control treatment at Flint. Tom Poy shared EPA lead experts' (Mike Schock and Darren Lytle of EPA's Office of Research and Development in Cincinnati) caution against simply adding orthophosphate without first studying the water quality and existing distribution system conditions to ensure that any installed treatment has a good chance of working. EPA lead experts have research and field experience showing the complexity of optimizing corrosion control treatment when water quality is significantly changed, as is the case for Flint.
3. **Offering Flint Free Help from EPA Experts.** Steve Busch has already provided the names of EPA lead experts (Mike Schock and Darren Lytle) to Flint, as has Susan Hedman, R5 Administrator. MDEQ and Region 5 agree that, to successfully control lead corrosion in the distribution system, Flint needs to review this situation holistically, while also addressing the lead issue in an expedited manner.
4. **Laying Groundwork for MDEQ/EPA Collaboration with Flint.** If Flint accepts the offer of technical assistance for optimizing corrosion control, Tom Poy suggested that MDEQ and EPA lead experts (Mike Schock and Darren Lytle) form a partnership to provide such help. EPA experts are able to provide pipe scale analyses, as well as other laboratory support. Although Flint (using their consultant) bears the ultimate responsibility for designing and installing corrosion control, MDEQ and EPA experts are willing and able to provide advice throughout the process.

END

Jennifer

Shekter Smith, Liane (DEQ)

From: Crooks, Jennifer <crooks.jennifer@epa.gov>
Sent: Thursday, September 10, 2015 5:58 PM
To: Shekter Smith, Liane (DEQ)
Cc: Benzie, Richard (DEQ); Busch, Stephen (DEQ); Prysby, Mike (DEQ); Poy, Thomas; Porter, Andrea; Devereaux, Tracy Jo (DEQ); Kuefler, Janet; Shoven, Heather; Deltoral, Miguel
Subject: Final Notes from call Tuesday 8/31/15 with MI DEQ RE: Flint

Thank you, Liane, for your edits—I incorporated all of your edits, and further clarified who said what.
Jennifer

Date: August 31, 2015
Present: Liane Shekter Smith, Richard Benzie, Steve Busch, (2 other MDEQ staff?), Tom Poy, Andrea Porter, Janet Kuefler, Jennifer Crooks

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The "Flint, MI Water Study Updates" website is putting added pressure on MDEQ and EPA to ensure that Flint addresses their lack of optimized corrosion control treatment in an expedited manner in order to protect the residents from exposure to high lead levels. Richard noted that there are numerous systems across the country that have installed corrosion control treatment, have optimized their corrosion control, but did not necessarily reduce their lead levels. We all acknowledged that this is true. MDEQ acknowledged that implementing installation of corrosion control treatment in Flint is prudent to protect public health since there are approximately 15,000 lead service lines within the city. EPA acknowledged that to delay installation of corrosion control treatment in Flint would likely cause even higher levels of lead over time as Flint's many lead service lines are continuously in contact with corrosive water.

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END

Jennifer

Jennifer Kurtz Crooks
Michigan Program Manager
Ground Water and Drinking Water Branch
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312.582.5853 (fax)

Shekter Smith, Liane (DEQ)

From: Crooks, Jennifer <crooks.jennifer@epa.gov>
Sent: Thursday, September 03, 2015 2:51 PM
To: Shekter Smith, Liane (DEQ); Benzie, Richard (DEQ); Busch, Stephen (DEQ); Prysby, Mike (DEQ)
Cc: Poy, Thomas; Porter, Andrea
Subject: Draft Notes from call Tuesday with MI DEQ RE: Flint

Importance: High

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Date: August 31, 2015
Present: Liane Shekter Smith, Richard Benzie, Steve Busch, (2 other MDEQ staff?), Tom Poy, Andrea Porter, Janet Kuefler, Jennifer Crooks

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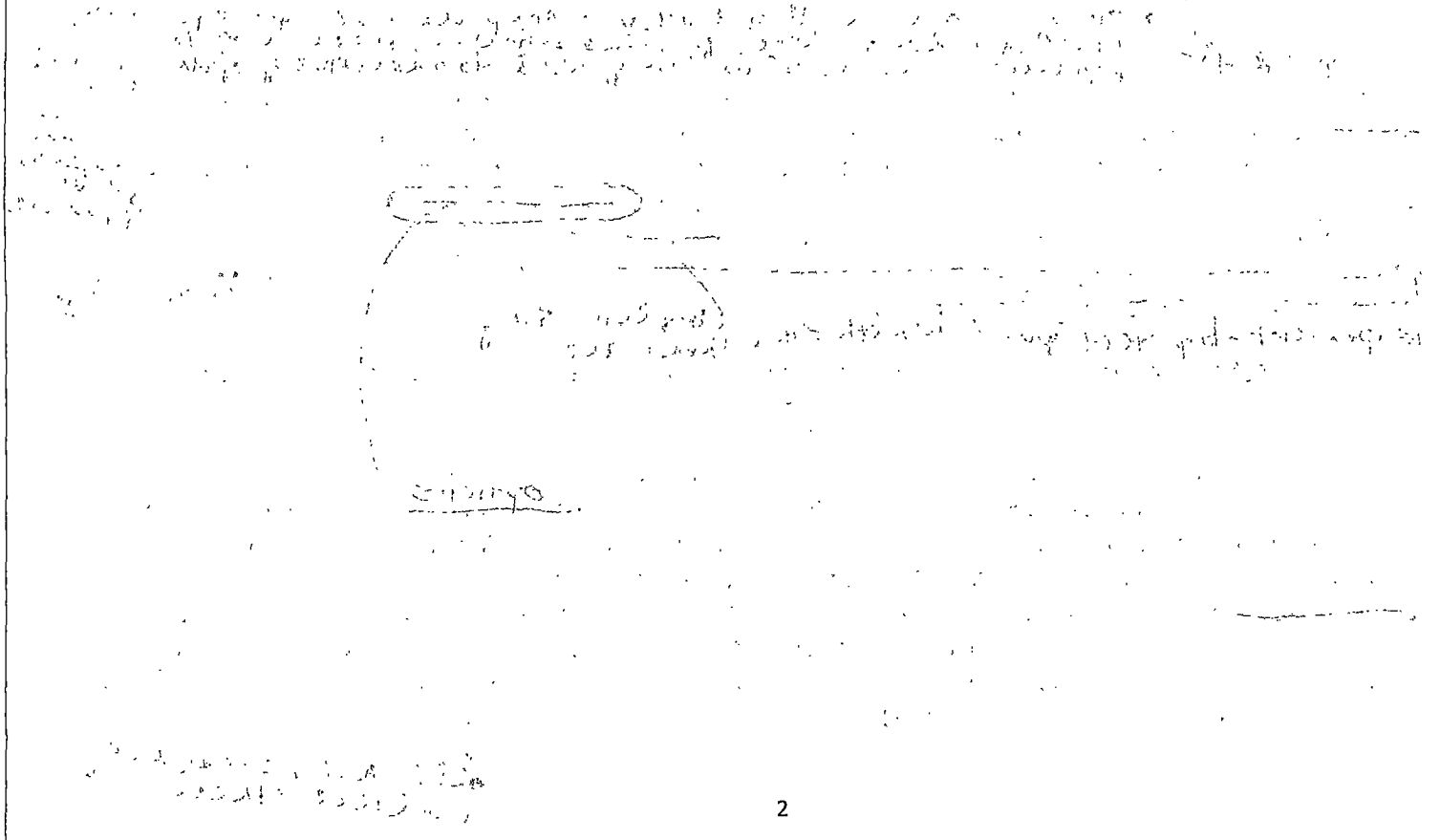
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Jennifer



DANIEL T. KILDEE
5TH DISTRICT, MICHIGAN

COMMITTEE ON
FINANCIAL SERVICES

SUBCOMMITTEE ON
HOUSING AND INSURANCE

SUBCOMMITTEE ON
MONETARY POLICY AND TRADE

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DEMOCRATIC POLICY AND
COMMUNICATIONS COMMITTEE

Congress of the United States
House of Representatives
Washington, DC 20515

September 9, 2015

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Washington, D.C. 20460

Mr. Dan Wyant
Director
Michigan Department of Environmental Quality
P.O. Box 30473
Lansing, MI 48909

Administrator McCarthy and Director Wyant:

The attached June 24, 2015, memorandum between two Environmental Protection Agency (EPA) employees, Miguel A. Del Toral and Thomas Poy, published recently by the American Civil Liberties Union of Michigan, suggests that there are high lead levels in the city of Flint, Mich., water transmission lines. Furthermore, this document reflects that children consuming this water had levels of lead in their blood in excess of three times what they were prior to the city of Flint switching its source water from the Detroit Water and Sewage Department (DWSD) to the Flint River.

In addition, this memorandum makes recommendations to Mr. Poy, Chief of the Ground Water and Drinking Water Branch of EPA Region 5, to do three things. First, for the EPA to work with the Michigan Department of Environmental Quality (MDEQ) to provide technical assistance to the city of Flint to deal with water quality issues. Second, it suggests the EPA review the compliance status of the city of Flint in respect to its compliance with the Lead and Copper Rule (LCR). Third, the memorandum recommends that the EPA conduct a review of the city of Flint testing procedures to ensure they are compliant with the LCR.

Regarding this memorandum and the surrounding water quality issues in the city of Flint, I have the following questions:

- Was this memorandum actually sent to Mr. Poy?

- Are the findings in the memorandum regarding the lead levels in the city of Flint water accurate?
- If there were in fact high levels of lead in the water in the city of Flint, when did the EPA and/or MDEQ plan to alert the public?
- What, if any, of the recommendations has the EPA followed from the memorandum?
- Given the demonstrated level of lead in the water in Flint, MI, is the water safe?

Regardless, I am very troubled by recent tests suggesting high levels of lead in the city of Flint's water system. As you know, on the EPA's website it says that lead above the "action level" in drinking water can cause a variety of adverse health effects, including delays in physical and mental development in babies and children.

According to the Safe Drinking Water Act, the EPA has the responsibility of enforcing water quality standards. EPA, however, has given the primary responsibility of enforcing water quality standards to the state of Michigan via MDEQ. As such, it is the responsibility of these agencies to ensure that the people of the city of Flint have safe drinking water.

Thank you and I look forward to hearing from you soon.

Sincerely,

Dan Kildee
MEMBER OF CONGRESS

cc:

State Senator Jim Ananich
State Representative Sheldon Neeley
State Representative Phil Phelps
Mayor Dayne Walling, City of Flint
Howard Croft, City of Flint
Susan Hedman, EPA
Thomas Poy, EPA
Michael Schock, EPA-ORD
Darren Lytle, EPA-ORD
Denise Fortin, EPA
Liane Shekter-Smith, MDEQ
Pat Cook, MDEQ
Stephen Busch, MDEQ
Brad Wurfel, MDEQ
Marc Edwards, Virginia Tech

- tech. assist.
- compliance w/ Pb/Cu rule
- sampling

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

September 17, 2015

VIA E-MAIL

The Honorable Jim Ananich
State Senator
State Capitol
P.O. Box 30036
Lansing, Michigan 48909-7536

The Honorable Sheldon Neeley
State Representative
State Capitol
P.O. Box 30014
Lansing, Michigan 48909-7514

The Honorable Phil Phelps
State Representative
State Capitol
P.O. Box 30014
Lansing, Michigan 48909-7514

Dear Senator Ananich and Representatives Neeley and Phelps:

Thank you for your letter of September 10, 2015, regarding water quality in the city of Flint (City). Your interest in this matter is appreciated. The Michigan Department of Environmental Quality (MDEQ) takes seriously its responsibility to ensure safe drinking water for all Michigan residents. The MDEQ maintains a robust public water supply regulatory program through long-standing partnerships with the United States Environmental Protection Agency (USEPA) and the state's regulated public water systems.

With respect to the draft memo referenced in your letter, the MDEQ does not review or receive draft memos from the USEPA, nor would we expect to while it is a draft.

Regulations associated with lead, copper, and corrosion control require communities to monitor water quality at customer taps. The monitoring protocols for sampling home water attempt to represent actual home water use, and they allow the MDEQ to get consistent results for year-over-year comparisons.

It is important to recognize that any home with lead plumbing or service connections will impart some amount of lead to water samples. While the compliance monitoring for lead in the City has not exceeded the federally-established Action Level, either before or after the City switched sources and treatment methods, there has always been

detectable lead in the City's water sampling program for homes that have lead plumbing or service connections. The City's monitoring program's purpose is to show aggregated levels throughout the entire system, not individual home levels.

The law requires the City to provide individual lead results to customers whose homes are sampled for compliance with the Action Level. Each customer with an individual sample result that exceeds 15 parts per billion is provided information on actions they can take to limit lead exposure in their drinking water. System-wide results from the most recent lead compliance monitoring are included each year in the City's annual Consumer Confidence Report, which is provided to customers and available online.

It is important to note that the City performed extensive home water tests for lead and copper last year and this year, and is meeting state and federal drinking water standards. Local health departments also administer annual blood level testing on children in Flint; results show no discernable rise in levels that might be expected if there was an elevated lead level in the City water supply. The City currently has no unresolved violations of state and federal drinking water standards.

The MDEQ continues to work with the City and federal regulators on the shared goal of ensuring safe, reliable drinking water in this community.

I look forward to discussing this issue in greater detail at the meeting next week. If you should have additional questions before then, please contact Ms. Maggie Pallone, Deputy Director, Policy and Legislative Affairs, at 517-284-6715 or pallonem@michigan.gov; or you may contact me.

Sincerely,

Dan Wyant
Director
517-284-6700

cc: U.S. Representative Dan Kildee
Mayor Dayne Walling, City of Flint
Mr. Howard Croft, City of Flint
Dr. Susan Hedman, Regional Administrator, USEPA, Region 5
Mr. Thomas Poy, USEPA, Region 5
Ms. Denise Fortin, USEPA, Region 5
Mr. Michael Schock, USEPA
Mr. Darren Lytle, USEPA
Mr. Marc Edwards, Virginia Tech
Mr. Harvey Hollins, Governor's Southeast Michigan Office
Mr. Bill McBride, Governor's Washington Office
Mr. Eric Brown, Governor's Washington Office
Mr. Jim Sygo, Chief Deputy Director, MDEQ
Ms. Madhu R. Anderson, Deputy Director, MDEQ
Ms. Maggie Pallone, Deputy Director, MDEQ
Ms. Sarah M. Howes, Legislative Liaison, MDEQ
Mr. Brad Wurfel, Communications Director, MDEQ
Ms. Liane Shekter Smith, MDEQ
Mr. Richard Benzie, MDEQ
Mr. Stephen Busch, MDEQ
Mr. Pat Cook, MDEQ

Thelen, Mary Beth (DEQ)

From:	The Office of Senator Ananich <SenJAnanich@senate.michigan.gov>
Sent:	Wednesday, October 21, 2015 12:43 PM
To:	hedman.susan@epa.gov; mccarthy.gina@epa.gov
Cc:	Jordan.Dickinson@mail.house.gov; mayor@cityofflint.com; HCroft@cityofflint.com; poy.thomas@epa.gov; Schock.michael@epa.gov; Lytle.darren@epa.gov; fortin.denise@epa.gov; Wyant, Dan (DEQ); aaron_suntag@stabenow.senate.gov; Bentley_Johnson@peters.senate.gov; Davis.CatherineM@epa.gov; repphelps@house.mi.gov; SheldonNeeley@house.mi.gov; snyde PPI
Subject:	Letter Requesting EPA Review of Flint, MI Water
Attachments:	2015.10.21 EPA Review Request FINAL.PDF

Administrator McCarthy and Regional Director Hedman,

Please see the attached letter regarding a request for an EPA review of Flint, Michigan's water treatment.

Please do not hesitate to contact my office if you have any questions. Thank you for your time and attention.

Sincerely,

The Office of State Senator Jim Ananich
Michigan Senate Minority Leader
District 27

cc: Sen
George K.
Lisa Shelba
Steve Busch
Maggie Pelline
Brad Wurfel

Director asked that I provide you a copy.
mlt
10-23

Orig: Dust

SENATE MINORITY LEADER
JIM ANANICH

517.373.0412
senjananich@senate.michigan.gov
senatedems.com/ananich

/jimananich @jimananich

October 21, 2015

Gina McCarthy
Administrator
United States Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Mail Code 6106A
Washington, DC 20460

Susan Hedman
Regional Administrator
United States Environmental Protection Agency Region 5
Ralph Metcalfe Federal Building
77 West Jackson Boulevard
Chicago, IL 60604

Re: EPA Review Needed on Flint, Michigan Water Treatment

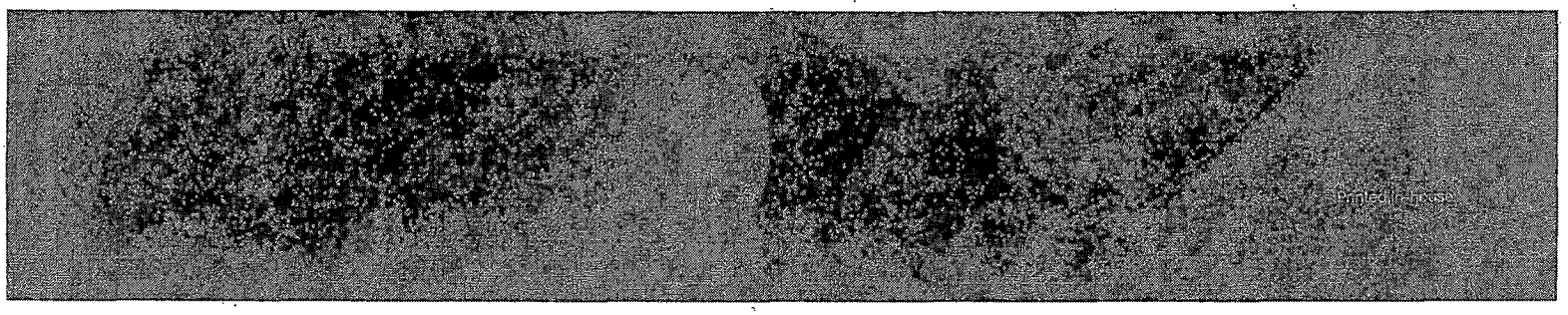
Administrator McCarthy and Regional Director Hedman,

Today Congressman Dan Kildee requested that the United States Environmental Protection Agency conduct an investigation into the water system in Flint, Michigan. I agree that such an investigation is vital to ensuring that the people responsible for Flint's dangerous water quality are held accountable. Similar to Congressman Kildee's request, I am requesting the EPA conduct a review of the Michigan Department of Environmental Quality's (MDEQ) oversight of water treatment in Flint as provided for in the Lead and Copper Rule, 40 CFR Sec. 141.80.

After decades of relying on water from the Detroit Water and Sewerage Department (DWSD), Flint began treating its own water from the Flint River in April 2014 at the behest of state-appointed Emergency Managers. DWSD had used — and continues to use — anti-corrosion treatments in its water to prevent lead leaching from an aging infrastructure into residents' drinking water. For a number of reasons, raw water from the Flint River is significantly more corrosive than the lake water that DWSD uses. Despite this, Flint chose not to treat the raw Flint River water by any method traditionally associated with preventing lead corrosion. Multiple consultants and the EPA advised the city to use additional corrosion control measures, but that advice went unheeded by the City of Flint and the MDEQ.

Foreseeably, lead has been seeping into Flint's drinking water for more than a year, causing an alarming rise in the number of children in Flint with elevated blood lead levels. Independent research conducted by Virginia Tech professor Marc Edwards indicated high lead levels in tap water, and a study led by Hurley Medical Center pediatrician Dr. Mona Hanna-Attisha revealed that in high-risk areas of the city, the rate of lead overexposure among children more than doubled since switching water sources. State data have confirmed these results.

Additionally, several questions remain regarding how Flint and state officials conducted water sampling under the Lead and Copper Rule. Allegedly, officials did not target samples in high-risk Tier 1 locations or repeat locations in subsequent tests. Consumers were also instructed to pre-flush their taps prior to collecting samples, resulting in lower lead level results. It is unclear whether a sufficient number of samples were taken or why MDEQ excluded two high lead level samples from Flint's July 2015 water quality report.



SENATE MINORITY LEADER
JIM ANANICH

517.373.0412
senjananich@senate.michigan.gov
senatedems.com/ananich

/jimananich @jimananich

The State of Michigan has pledged to help reconnect the City of Flint to DWSD and take additional steps to help remediate the lead problem. However, these are stopgap measures that will never undo the damage already done.

Ultimately, the EPA retains the ability and responsibility to oversee the state's efforts to obtain and maintain safe drinking water for its residents. As such, I appreciate that the EPA has established the Flint Safe Drinking Water Task Force. However, it also is within the EPA's power to review the actions of MDEQ and the City of Flint as they pertain to lead testing and treatment under the Lead and Copper Rule. We want to ensure Flint remains compliant once it switches its permanent water source to the Karegnondi Water Authority.

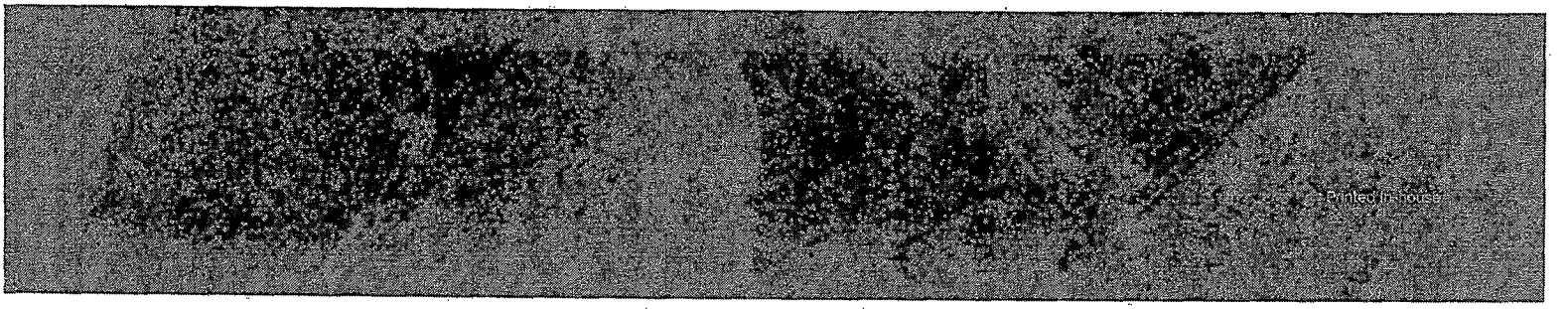
I respectfully request that, under 40 CFR Sec. 142.19, Regional Administrator Hedman review MDEQ's determinations regarding corrosion control for lead in Flint, Michigan. Regardless of the findings, I am also requesting that Regional Administrator Hedman make public all evidence gathered during the course of that review. Michigan citizens deserve to know whether MDEQ is operating safely and effectively.

If you have any questions, please contact my office at senjananich@senate.mi.gov or (517) 373-0142. Thank you for your consideration.

Sincerely,

Jim Ananich
Senate Democratic Leader
District 27

cc:
Governor Rick Snyder
U.S. Representative Dan Kildee
U.S. Senator Debbie Stabenow
U.S. Senator Gary Peters
State Representative Sheldon Neeley, District 34
State Representative Phil Phelps, District 49
Mayor Dayne Walling, City of Flint
Howard Croft, City of Flint
Susan Hedman, EPA
Thomas Poy, EPA
Michael Schock, EPA-ORD
Darren Lytle, EPA-ORD
Denise Fortin, EPA
Dan Wyant, MDEQ
Liane Shekter-Smith, MDEQ
Pat Cook, MDEQ
Stephen Busch, MDEQ
Brad Wurfel, MDEQ
Marc Edwards, Virginia Tech



Frequently Asked Questions:

Water Lead Levels in the City of Flint
September 2015

How can lead get into drinking water?

Lead detections in Flint drinking water exist at the home level. Sampling at the Flint Water Treatment Plant has shown no lead in its treated water. However, this contaminant leaches into water from a home's lead service lines, lead solder, and leaded plumbing materials including fixtures, faucets, and fittings.

Does the city meet federal drinking water standards for lead and copper?

Yes, the city is meeting state and federal guidelines for lead and copper.

The City of Flint has regularly monitored for lead and copper since federal law began requiring it in 1991.

When the City changed water sources in May 2014, state and federal law required the city to sample for lead and copper for a full year to determine how the water may be interacting with residential lead plumbing to increase lead levels. While the city's results show residential lead levels below the federal threshold for immediate response activities, Flint is moving quickly to optimize corrosion control measures in its water system.

Some individual homes showed high numbers for lead. Isn't that a concern?

For the homeowner, yes it is. There is no "safe" level for lead, and while the leading cause of lead poisoning around the country is lead paint, any source of lead ingestion is worthy of concern.

But the State and federal guidelines for lead and copper acknowledge an important reality: Any home that has a lead service connection or lead plumbing will impart some varying amount of lead into the home's water. The only way to eliminate lead in a home water system is to remove lead plumbing or replace lead service connections to the city system.

The lead and copper rule requires the local operator to sample dozens, sometimes hundreds of homes in the service area to get a general sense of how the water supply is interacting with lead plumbing and service connections. The tests are done specifically at homes with lead service connections. Individual results vary and all participants are

Are there other ways the city monitors for lead exposure?
The County Health Department, overseen statewide by the Michigan Department of Health and Human Services, regularly monitors blood levels in children throughout Michigan communities. The leading cause of lead poisoning is exposure to lead paint.

Blood lead level testing results for the 12-month period just after the City of Flint changed its water source (May 2014 – April 2015) showed no significant change in the pattern of blood lead levels in Flint, compared to the previous three years. This data suggests the recent change in water source by the City of Flint has not contributed to an increase in lead exposure throughout the community.

How does the state decide if the water is creating a lead problem?
Compliance with the federal lead rule is based on a 90th percentile calculation. If more than 10 percent of samples report lead above the federal action level of **15 parts per billion**, a water supply has an "action level exceedance." An exceedance is not a violation. It triggers other requirements which could include public notification, additional water quality sampling, and possibly further treatment.

While some of Flint's individual samples exceeded the 15 parts-per-billion lead action level, compliance is based on **the 90th percentile of samples**. The City of Flint's 90th percentile level has ranged between 0 parts per billion in 2008 and 2011, and 15 parts per billion in 1992, but never exceeded the action level.

The two most recent sampling periods, in 2014 and 2015, were 6 parts per billion and 11 parts per billion, respectively.

Did the city use <u>every</u> sample they got back?
Sampling requirements for lead and copper are designed to target the most common pathways to lead ingestion in homes with the least protection. The sample must be collected from a commonly used kitchen or bathroom tap, and in accordance with the provided sampling instructions. Homes that employ filtration or additional treatment cannot be included. Samples must also be collected within the established monitoring period.

I have a lead service connection or lead plumbing. What should I do?
Replacement is the only way to eliminate lead exposure. However, here are some interim steps homeowners can take to reduce it:

Flush pipes before drinking, and only use cold water for consumption.

The more time water has been sitting in your home's pipes, the more lead it may contain. When water in a particular faucet has not been used for six hours or longer, "flush" cold-water pipes by running the water until it becomes as cold as it will get. This could take five to 30 seconds if there has been recent water use elsewhere in the home, such as showering or flushing toilets. Otherwise, it could take two minutes or longer.

Use only water from the cold-water tap for drinking, cooking, and especially for making baby formula. Hot water is likely to contain higher levels of lead.

Who is responsible for replacement of leaded materials?
Replacement of service pipes on private property and any leaded plumbing materials within the home is a **homeowner's responsibility**. The City of Flint owns the service pipe from the water main to the curb stop valve, and that is **the City's responsibility**. This valve is normally located two feet in from the street curb. From there to the house is private property and the responsibility of the homeowner.

Why doesn't the city at least replace its portion of lead service lines?
Partial lead service line replacement has been shown to mobilize more lead and make the situation worse. Only full lead service line replacement has been demonstrated effective in achieving long-term reductions in drinking water lead levels.

What is the City's timeline for installation of corrosion control treatment?
The federal government allows the steps to complete the installation of optimal corrosion control treatment and follow-up monitoring to take up to five years.

However, the City of Flint has committed to completing installation of Optimized Corrosion Control Treatment in **less than six months**.

What will happen when Flint joins the Karegnondi Water Authority next year?
The City has committed to having Optimized Corrosion Control Treatment in place prior to its connection with the Karegnondi Water Authority (KWA). The water provided by KWA will come from a new source, Lake Huron. The city will continue its lead and copper sampling every six months. Additionally, the city's water treatment plant will continue to operate with uninterrupted Optimized Corrosion Control Treatment.

How long would it take to replace lead service lines throughout Flint?
The city has about 32,900 service connections in total. **More than 15,000** of these connections are considered lead service lines. Even if many crews were contracted, it would likely take up to 15 years to complete this work.

What would it cost to replace the lead service line at my house?
Average costs to replace a lead service line at an individual home range from $2,000 to $8,000. Costs vary depending on the length and size of service line that is needed, as well as the ground cover and soil conditions encountered.

With more than 15,000 lead service lines at an estimated average cost of $4,000 for each replacement, total cost could **be $60 million or more**.

DRINKING WATER - LEAD - DISTRIBUTION OF RESPONSIBILITIES

Environmental Protection Agency

1. Promulgation of Federal Safe Drinking Water Act Rules
2. 1974 Safe Drinking Water Act
   - 1991 Lead and Copper Rule
   - 2000 Lead and Copper Rule Minor Revisions
   - 2007 Lead and Copper Rule Short Term Revisions
   - ???? Lead and Copper Rule Long Term Revisions
3. Granting Primacy of Federal Regulations to States
4. Auditing of State Public Water Supply Programs
5. Provide Funding to States

Michigan Department of Environmental Quality

1. Primacy - Michigan Safe Drinking Water Act and Administrative Rules
2. Oversight of public water systems
3. Inspections
4. Construction Permitting
5. Provide loans to water systems for public infrastructure improvements
6. State Laboratory Services
7. Laboratory Certification
8. Establish monitoring requirements, quantity and frequency
9. Verification of monitoring results and compliance determination
10. Notify water systems of Action Level Exceedance
11. Establish Water Quality Parameter Ranges, as necessary
12. State Reporting to EPA
13. Operator Training and Certification

City of Flint Water Customers

1. Certified Operation of public water system
2. Establish Water Rates
3. Obtain construction permits
4. Reporting to MDEQ
5. Coordination of lead and copper sampling
   - Establishing a Tiered Sampling Pool
   - Providing Sampling Kits and Instructions to customers
   - Obtain signed statements from participating customers
   - Obtain sample analysis
   - Provide individual lead sample result to participants
   - Comply with Action Levels for lead and copper
   - Provide lead monitoring and notice Certification to MDEQ
6. Provide Annual Report (CCR) to all customers
7. Conduct Water Quality Parameter Monitoring
8. Recommend and Install Optimized Corrosion Control Treatment
9. Provide Public Notification, as necessary
10. Replace public portion of lead service, as necessary

Water Customers

1. Participate in lead sampling as requested
2. Request lead testing if concerned
3. Follow lead sampling instructions
4. Provide signed information on how sample was collected
5. Review individual result material
6. Follow instructions for reducing lead exposure
7. Replace private leaded service line and plumbing materials with lead-free products
8. Obtain plumbing permits and comply with code requirements
9. Pay Water Bills
10. Read Annual Report (CCR)
11. Read and follow Public Notification materials

Olszewski, Rosemarie (DEQ)

From:	Thelen, Mary Beth (DEQ)
Sent:	Monday, November 02, 2015 12:01 PM
To:	Olszewski, Rosemarie (DEQ)
Subject:	FW: Response from EPA on using SRF for Private Line Replacement
Attachments:	10-6-2015 Response - Kildee.pdf; 100615 SRF for Private Line Replacement (Hedman).pdf

2 sets.

From: Pallone, Maggie (DEQ)
Sent: Monday, November 02, 2015 11:51 AM
To: Wyant, Dan (DEQ); Wurfel, Brad (DEQ); Sygo, Jim (DEQ); Shekter Smith, Liane (DEQ); Busch, Stephen (DEQ); Krisztian, George (DEQ)
Cc: Shaler, Karen (DEQ); Thelen, Mary Beth (DEQ); Butler, Sonya (DEQ)
Subject: FW: Response from EPA on using SRF for Private Line Replacement

Follow up communication between Kildee and EPA on replacement of lead service lines and the use of SRF dollars. Nothing that hasn't already been clarified to us by Susan and others at EPA, but sending so you have this in your files.

Maggie

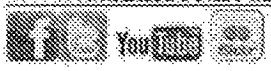
From: Dickinson, Jordan [mailto:Jordan.Dickinson@mail.house.gov]
Sent: Friday, October 30, 2015 5:10 PM
To: Pallone, Maggie (DEQ) <PalloneM@michigan.gov>
Subject: Response from EPA on using SRF for Private Line Replacement

Hi Maggie,

Here is the letter we discussed. I look forward to hearing from you next week.

Have a great weekend,

Jordan Dickinson
Legislative Assistant
Congressman Dan Kildee (MI-05)
227 Cannon House Office Building
Washington, D.C. 20515
Phone: (202) 225-3611
www.dankildee.house.gov



Sign up for Congressman Dan Kildee's e-newsletter

cc: Jim S
Maggie
Liane
Sonya
RTS
11/3

01/9 : mbt

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF WATER

OCT 2 8 2015

The Honorable Dan Kildee
House of Representatives
Washington, D.C. 20515

Dear Congressman Kildee:

Thank you for your October 6, 2015, letter asking whether federal law permits a state to use the Drinking Water State Revolving Fund to finance the replacement of privately owned lead water service lines.

Drinking Water State Revolving Fund loans can be used to finance lead service line replacement on public and private property, provided the loans are made to an eligible entity in accordance with the Safe Drinking Water Act to protect public health, and all other Drinking Water State Revolving Fund requirements are met. The eligible entity in this case is the Flint community water system. The U.S. Environmental Protection Agency is actively discussing the option of using the Drinking Water State Revolving Fund for lead service line replacement with the Michigan Department of Environmental Quality and the City of Flint.

Again, thank you for your letter. If you have further questions, please contact me or your staff may contact Cathy Davis in the EPA's Office of Congressional and Intergovernmental Relations at Davis.CatherineM@epa.gov or (202) 564-2703.

Sincerely,

Kenneth J. Kopocis
Deputy Assistant Administrator

October 6, 2015

Administrator Susan Hedman
Environmental Protection Agency Region 5
77 West Jackson Boulevard
Chicago, IL 60604

Administrator Hedman:

An independent scientific study recently discovered that the water in my hometown of Flint, MI, contains dangerous levels of lead. I, along with many others, am pursuing a variety of avenues to help address this situation and I wanted to clarify one possible option: It is our understanding that federal law permits states to use Safe Drinking Water State Revolving Funds to finance the replacement of privately owned lead water service lines, is this correct?

I received the attached letter from Michigan Governor Rick Snyder on October 2, 2015, asking for my assistance in regards to this question and I would appreciate further clarification.

Again, thank you for helping to clarify this question as well as exploring all options to ensure the people in Flint have safe drinking water.

Sincerely,

Dan Kildee
MEMBER OF CONGRESS

Debbie Stabenow
U.S. SENATOR

Gary C. Peters
U.S. SENATOR

United States Environmental Protection Agency
Regional Administrator
Region 5
77 West Jackson Boulevard
Chicago, IL 60604-3590

SEP 15 2015

The Honorable Daniel Kildee
Member, U.S. House of Representatives
Washington, D.C. 20515-1313

Dear Congressman Kildee:

Thank you for your September 9, 2015 letter regarding drinking water quality in the City of Flint. EPA is actively working with the Michigan Department of Environmental Quality (MDEQ) to help the City provide clean and safe water.

Consistent with the recommendations in the internal memorandum cited in your letter, EPA is working with MDEQ to monitor Flint's compliance with the federal Lead and Copper Rule. On August 17, 2015, MDEQ notified Flint that additional treatment will be required to optimize corrosion control and the City is taking steps to do so. Experts from EPA's Office of Research and Development are providing technical assistance to Flint to implement those corrosion control improvements.

Flint residents who are concerned about lead in drinking water may request water sampling by the local water utility. General information about lead in drinking water and tips to reduce lead exposure are available at http://water.epa.gov/drink/info/lead/index.cfm

Again, thank you for your letter. We look forward to a more detailed discussion at the meeting that is being set up on Monday. In the meantime, if you have further questions, please contact me or your staff may contact Denise Fortin or Ronna Beckmann, the Region 5 Congressional Liaisons, at (312) 886-3000.

Sincerely,

Susan Hedman
Regional Administrator

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Olszewski, Rosemarie (DEQ)

From:	Thelen, Mary Beth (DEQ)
Sent:	Monday, November 02, 2015 12:01 PM
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Subject:	FW: Response from EPA on using SRF for Private Line Replacement
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2 sets.

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Sent: Monday, November 02, 2015 11:51 AM
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Cc: Shaler, Karen (DEQ); Thelen, Mary Beth (DEQ); Butler, Sonya (DEQ)
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Maggie

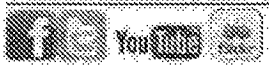
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Sent: Friday, October 30, 2015 5:10 PM
To: Pallone, Maggie (DEQ) <PalloneM@michigan.gov>
Subject: Response from EPA on using SRF for Private Line Replacement

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Have a great weekend,

Jordan Dickinson
Legislative Assistant
Congressman Dan Kildee (MI-05)
227 Cannon House Office Building
Washington, D.C. 20515
Phone: (202) 225-3611
www.dankildee.house.gov



Sign up for Congressman Dan Kildee's e-newsletter

cc: Jim S
Maggie
Liane
Sonya
RSO

01/9 : mbt

11/3

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF WATER

OCT 2 8 2015

The Honorable Dan Kildee
House of Representatives
Washington, D.C. 20515

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Sincerely,

Kenneth J. Kopocis
Deputy Assistant Administrator

October 6, 2015

Administrator Susan Hedman
Environmental Protection Agency Region 5
77 West Jackson Boulevard
Chicago, IL 60604

Administrator Hedman:

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Sincerely,

Dan Kildee
MEMBER OF CONGRESS

Debbie Stabenow
U.S. SENATOR

Gary C. Peters
U.S. SENATOR

STATE OF MICHIGAN

September 10, 2015

Michigan Department of Environmental Quality
Executive Division
DEQ Director: Dan Wyant
P.O. Box 30473
Lansing, MI 48909-7973

Director Wyant,

In light of recently released findings by the American Civil Liberties Union, independent researchers and a troubling interim U.S. Environmental Protection Agency memo from June, we are requesting additional answers about the safety and treatment of the City of Flint's water.

Several disturbing points have been raised and we have a number of urgent questions, including:

- **When did the MDEQ become aware of the June 24, 2015, interim EPA memo and whom was it shared with?**
  - Which Flint city officials also received this information?
  - Why was the memo not immediately shared with the public?
  - What response did MDEQ have to the EPA concerns raised in the memo?
  - Were any actions taken by the MDEQ as a result of the issues mentioned in the memo?
  - What steps, if any, were taken to determine the validity of the Virginia Tech study?

- **Please explain why the pre-flushing method of sampling was used in this instance.**
  - Is it the same method that is applied to all sampling or does the agency have the discretion to decide?
  - Who is responsible for making the decision to pre-flush?
  - The EPA memo references the Lead Copper Rule requirement that systems greater than 50,000 users maintain "corrosion control treatment." As the regulator, why did the MDEQ choose not to enforce that standard?
  - The EPA recommends allowing water to rest for at least six hours, but no more than 12 hours, before taking a sample. On MDEQ's Web site, it suggests flushing the line for five minutes before the six-hour rest. How did the department arrive at this method?

- According to a July 9, 2015, article on DeadlineDetroit.com, "Scary: Leaded Water and One Flint Family's Toxic Nightmare,"

  "The EPA offered Flint officials the use of agency experts to help get the situation under control," said Del Toral, but added that, to his knowledge, the city has so far declined all help.

  LeeAnne Walters said that when she asked why city officials weren't taking the EPA's offer of assistance, she was told, "We don't need it."

STATE OF MICHIGAN

Flint spokesman Lorenz, on the other hand, maintained "the city continues to work closely with the MDEQ and the EPA Regional Office."

- Who refused the EPA's offer of expert assistance and why?

- **Is the damage done to the pipes (as described in the EPA report) accurate?**
  - If yes, will damaged pipes continue to leach lead or will properly treated water safely reach consumers?
  - What is the plan and timeline to address it?

- **And most importantly, what can be done immediately to ensure safe, affordable drinking water for the citizens of Flint?**

Many of the decisions that led to the current situation occurred while a state-appointed manager was in control and MDEQ personnel were consulted about testing methods and how to address the situation. In addition, MDEQ also encouraged the method of water testing used by Flint officials. We believe that there is a heightened obligation by the state to make this right.

Due to the serious public health threats of this situation, we respectfully request a response to these matters by Monday, September 14, 2015.

We will do our best to accommodate meeting requests, if necessary, but would appreciate written responses to the above questions so that we can make informed decisions swiftly to address these serious concerns.

Sincerely,

Jim Ananich
Senate Democratic Leader
District 27

Sheldon Neeley
State Representative
District 34

Phil Phelps
State Representative
District 49

cc:
U.S. Representative Dan Kildee
Mayor Dayne Walling, City of Flint
Howard Croft, City of Flint
Susan Hedman, EPA
Thomas Poy, EPA
Michael Schock, EPA-ORD
Darren Lytle, EPA-ORD
Denise Fortin, EPA
Liane Shekter-Smith, MDEQ
Pat Cook, MDEQ
Stephen Busch, MDEQ
Brad Wurfel, MDEQ
Marc Edwards, Virginia Tech

Shekter Smith, Liane (DEQ)

From: Krisztian, George (DEQ)
Sent: Friday, October 16, 2015 6:54 AM
To: Sygo, Jim (DEQ); Wyant, Dan (DEQ); Wurfel, Brad (DEQ); Shekter Smith, Liane (DEQ)
Cc: Thelen, Mary Beth (DEQ); Shaler, Karen (DEQ)
Subject: FW: 3rd Quarter Water Report

FYI

George L. Krisztian
Flint Action Plan Coordinator
Laboratory Director
Michigan Department of Environmental Quality
Desk ph (517) 284-6719
Cell ph (517) 204-0381

From: Marc Edwards [mailto:edwardsm@vt.edu]
Sent: Thursday, October 15, 2015 7:29 PM
To: 'Howard Croft'; 'Laura Sullivan'
Cc: 'Gerald (Jed) Natzke'; 'Andy Leavitt'; 'Amy Hovey'; 'Brent Wright'; 'Lytle, Darren'; 'Flint Mayor'; 'donna.cole'; Dykema, Linda D. (DHHS); Krisztian, George (DEQ); 'Henry, James'; 'James Gaskin'; 'Jason Lorenz'; 'jmikewright'; 'JoAnne Herman'; 'John O'Brien'; 'Kirk Smith'; larry.koehler@mcc.edu; 'Lawrence Reynolds'; 'Lawrence Reynolds'; 'Michael Glasgow'; 'Wright, Michael'; 'Lane, Mike'; Prysby, Mike (DEQ); 'Natasha Henderson'; 'Norb Birchmeier'; 'Pete Levine'; 'Robert Bincsik'; rosejo@msu.edu; 'Russell Hudson'; 'Samir Matta'; schock.michael@epa.gov; 'Sean Kammer'; Busch, Stephen (DEQ); 'Warren Green'; Wurfel, Brad (DEQ); 'Anthony Chubb'; 'Kevin Keane'
Subject: RE: 3rd Quarter Water Report

I have gotten a lot of questions about this., so figured I would answer in one e-mail.

The city is still using the MDEQ sampling approach. That method takes the EPA sampling method, and adds two modifications, both of which are technically legal, but "miss" lead in water that is normally present when people use it. I have been trying to get these modifications banned since 2007, because they give a false low measurement of lead in water risks on the day you sample. As a result, a city can be meeting the EPA rule, technically, and still have a huge problem with elevated blood lead in children.

The two modifications are:

1) **Using a sample bottle with a tiny opening**. This forces consumers to fill the bottles at a very low flow rate. The net effect of this, is that particulate Pb that would normally flow into a consumers water glass at a normal flow rate, stays on the pipe when you sample for lead. When a consumer fills a glass or collects water for drinking, the particles fall off.
2) **Pre-cleaning the pipes the night before sampling (aka. Pre-flush).** This basically remediates and sweeps the pipe clean of lead the night before sampling, so that the next morning when you sample, you get unusually low lead. The sampling protocol used by MDEQ requires a **5 minute pre-cleaning.**

When Virginia Tech sampled in Flint, we used the EPA protocol, without the modifications that miss lead in water problems.

I hope this explains the discrepancy. The MDEQ approach could give people a result for 0 ppb lead in water, and when they collect a sample for cooking or drinking it can be 100 ppb. I have seen it happen. **No one who is getting a low result using the MDEQ approach, should be told their water is safe to drink.** The result is meaningless. If it is high with

the MDEQ approach, you have a very, very serious problem. MDEQ is also not the only primacy agency in the country using these methods that miss lead, so **I am not blaming anyone, I am just stating the facts.**

Miguel Del Toral of EPA warned MDEQ to stop using this method back in Apri-May in writing, because it would hide a lead problem if they existed, and they basically told him to mind his own business. I also asserted that Miguel was right, in the ACLU report in June. http://www.deadlinedetroit.com/articles/12697/scary_leaded_water_and_one_flint_family_s_toxic_nightmare#.ViA1Zn7nvIU

Best Regards, Marc

DEADLINE DETROIT lifestyle

(/lifestyle)

Scary: Leaded Water and One Flint Family's Toxic Nightmare

July 9th, 2015, 11:28 PM

Like 3 70

Curt Guyette is an investigative reporter for the ACLU of Michigan. His work, funded by a grant from the Ford Foundation, focuses on emergency management and open government. He writes regularly for Michigan Democracy Watch Blog. (http://www.aclumich.org/democracywatch/index.php/entry/hard-to-swallow-toxic-water-in-a-toxic-system)

By Curt Guyette

It took a while for LeeAnne Walters to realize the full impact of the number: 13,200.



Walters—a stay-at home mom with four sons and a husband in the Navy—had seen other numbers reflecting the quality of drinking water at her Flint home that were devastating. But 13,200? She'd never seen anything like this.

The city had tested her water twice in this past March and both times found dangerously high levels of lead—104 parts per billion (ppb) and 397 ppb, respectively.

Those numbers filled her with dread, because they meant her family had been exposed to high levels of a terribly toxic heavy metal that put her children's future in jeopardy.

But it was the result of a third test of the tap water in her home, performed by independent experts at Virginia Tech University, that most stunned Walters.

"It took a while for me to wrap my head around it," said Walters.

The VT researchers discovered lead levels in Walters' water reached a jaw-dropping 13,200 ppb—more than twice the amount at which the U.S. Environmental Protection Agency classifies water as hazardous waste.

"When I saw those numbers I was shocked," said Virginia Tech professor Marc Edwards, a former MacArthur Fellow and respected authority on corrosion in drinking-water systems, who oversaw the tests.

Edwards played a key role in discovering and addressing the problem of corroded water pipes and lead in Washington, D.C. during the early 2000s, in what's described as the *worst* contamination crisis ever seen in a major *urban* water system.

In terms of lead levels, the Walters family's numbers eclipsed even the worst D.C. homes.

"I have never in my 25-year career seen such outrageously high levels going into another home in the United States," said Edwards. "This was literally hazardous-waste levels."

But the condition of Walters' tap water raises a much more far-reaching question: Since the city moved away from Detroit's water system and began pumping water from the Flint River, how many other families have been put at risk by the city's questionable testing procedures and handling of the water supply?

The Walters family surely isn't alone in dealing with the threat of lead-laced drinking water. Flint has tens of thousands of homes that are a half-century old or older, built at a time when water service lines were typically made of lead.

And according to various experts, including an EPA water-quality specialist, the city's actions are only exacerbating the threat.

"What the public needs is accurate information," explained Miguel Del Toral, regulations manager for the Ground Water and Drinking Water Branch of the EPA's Region 5.

Instead, the city is utilizing testing measures that almost ensure that worst-case scenarios such as the one facing the Walters family escape detection, asserted Del Toral in an internal EPA memo provided to the ACLU of Michigan.

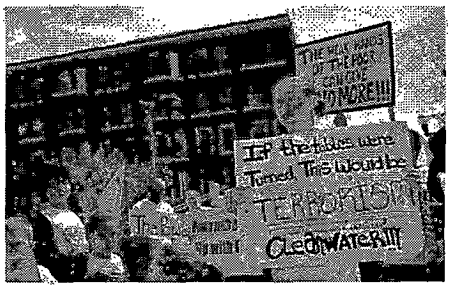
Compounding the threat is what Del Toral describes as the continued inability of officials to adequately treat water coming into people's homes from the Flint River.

"I don't want to scare people unnecessarily," said Del Toral in a phone interview from his home in Chicago. "But there is absolutely a problem in Flint that needs to be addressed right away."

During his interview with the ACLU of Michigan, Del Toral said he was willing to go on the record with his concerns, but that he was doing so as a private citizen, not as a representative of the EPA.

EPA rules, he said, required that such interviews be routed through the agency's public affairs people. But he's willing to speak out nonetheless, he said, because of the potential harm to the public is so great.

WATERING DOWN THE TESTS



Residents protest the poor water quality

Perhaps the most vexing problem in all of this is the contamination caused by the city's decades-old network of lead and iron pipes—a problem directly connected to the switch to river water, and the city's failure to adequately treat it.

Under the U.S. Environmental Protection Agency's rules, if lead reaches a level of 15 parts per billion in water, the source of the problem must be identified and corrected.

In early March, after months of requests (and only after Walters had received a doctor's note raising concerns about problems with the water), the city finally conducted a test. It found lead levels of 104 ppb the first time. A second test recorded a level of 397 ppb.

Blood tests, taken after those water-sample numbers were reported, revealed that one of her children, a four year old, had lead poisoning.

The news was devastating, said Walters, and the concern it creates for her child's future is haunting.

"Lead can affect almost every organ and system in your body," according to the EPA's web site. "Children six years old and younger are most susceptible ... Even low levels of lead in the blood of children can result in: behavior and learning problems; lower IQ and hyperactivity; slowed growth; and hearing problems."

Those dangers made Walters all the more determined to get her questions answered.

For one thing, she wanted to know why residents were being instructed to "pre-flush" water lines before drawing samples that would be tested by the city

After much searching, she found Del Toral at the EPA's Region 5 in Chicago. He explained to her that her instincts were right, and that she had good cause to be concerned about the way testing was being done.

"The practice of pre-flushing before collecting compliance samples has been shown to result in the minimization of lead capture and significant underestimation of lead levels in drinking water," wrote Del Toral in an internal memo dated June 24.

Del Toral went on to say that the city's testing methods were a "serious concern" because they "could provide a false sense of security to the residents of Flint regarding lead levels in the water." As a result, he warned, residents could fail to take the necessary precautions to protect their families from lead in the drinking water.

Virginia Tech's Edwards completely agrees with Del Toral's assessment.

"The net effect of a 'pre-flush' is to greatly reduce the likelihood of detecting lead in samples collected ... that would normally be present in the consumers drinking water," Edwards wrote in an email. "I have long maintained that the practice should be banned, as it artificially lowers the amount of lead detected in samples versus typical consumer exposure."

Asked about these concerns, city spokesman Jason Lorenz offered the following email reply: "While I cannot directly respond to Mr. Del Toral's remarks without first contacting the EPA Region 5 office, I can say that the City of Flint follows all the testing procedures and schedules as required by the U.S. EPA."

He added that the Michigan Department of Environmental Quality (MDEQ) endorses the city's sampling method. The MDEQ did not respond to phone calls and e-mails seeking its comments on the controversy.

Del Toral contended in an interview that what Flint's doing is actually exploiting a "loophole" in the law.

"From a technical standpoint, there's no justification for the way Flint is conducting its tests," Del Toral said. "Any credible scientist will tell you [the city's] method is not the way to catch worst-case conditions."

There is no legitimate reason for the city's methodology, said Del Toral.

During his interview with the ACLU of Michigan, Del Toral said he was willing to go on the record with his concerns, but that he was doing so as a private citizen, not as a representative of the EPA.

EPA rules, he said, required that such interviews be routed through the agency's public affairs people. But he was willing to speak out nonetheless, he said, because of the potential harm to the public.

FLUSHING OUT REAL ANSWERS

It was Del Toral who, after determining that the lead problem plaguing the Walters family was coming from outside their home, connected LeeAnne with Edwards at Virginia Tech.

Instead of taking a single sample after a line had been "pre-flushed" under the city's direction, Edwards instructed Walters to collect a series of samples from water that had been allowed to sit in the service line long enough to accurately reflect levels the family could be exposed to under normal use.

(Meanwhile, that same service line, dug up and replaced after the sample collection, was found to be made of lead in one section and iron in another.)

Edwards tested the water and discovered that the lead contamination ranged from 200 ppb to the 13,200 ppb figure that stunned LeeAnne Walters—and should likewise shock many others.

Given the age of much of Flint's infrastructure, Edwards agrees with Del Toral's assessment that the test results they found at the Walters home amount to an alarm going off, and others in the city need to pay attention.

"I do not see any reason why there would not be serious problems occurring in at least some other Flint homes," said Edwards.

In 1986, the U.S. Safe Drinking Water Act was amended to prohibit the use of lead pipes in public water systems. Every house built before that is potentially at risk, said Edwards. About half of Flint's roughly 40,000 homes are at least 50 years old.

Making things worse is the fact that the high levels of chlorine being used to treat Flint's dirty river water lead to the creation of a carcinogenic byproduct know as total trihalomenhanes, or TTH?M. To keep TTHM levels down, the city is adding ferric chloride. The trouble is, that additive can also accelerate the corrosion of lead and iron pipes.

Adding yet another layer to the problem is something the city is *not* doing.

According to Del Toral, Flint should be adding corrosion-control chemicals designed to help keep lead and copper in pipes from leaching into drinking water. Doing so is required by federal regulations, wrote Del Toral in his memo.

"To our knowledge, that is inaccurate," said Flint spokesman Lorenz. "Before the plant was placed in operation, the City (and our engineering firm) had numerous discussions with DEQ personnel and inquired if corrosion-control chemicals – typically phosphates --needed to be included in the treatment process. The use of these chemicals was not required or mandated."

What's indisputable is this:

Flint's water contained corrosion-control chemicals until April 2014, when Flint's ties to the Detroit water system were severed. Flint officials hailed that changeover as a cost-cutting move for a city facing a financial crisis so severe it had been placed under the control of a state-appointed emergency manager.

Discontinuing the use of the anti-corrosion chemicals allowed toxic scale built up on the insides of pipes over the past decades to be released into water flowing into people's homes, explained Del Toral.

In his memo, Del Toral warned: "The lack of mitigating treatment is especially concerning as the high lead levels [that result] will likely not be reflected in the City of Flint's compliance samples due to sampling procedures used..."

In other words, at the same time the city is exacerbating the problem, it's conducting tests that will probably fail to identify the true extent of the threat.

Del Toral described the situation as a "major concern."

"In the absence of any corrosion control treatment, lead levels in drinking water can be expected to increase," he warned in his memo.

The EPA offered Flint officials the use of agency experts to help get the situation under control, said Del Toral, but added that, to his knowledge, the city has so far declined all help.

LeeAnne Walters said that when she asked why city officials weren't taking the EPA's offer of assistance, she was told, "We don't need it."

Flint spokesman Lorenz, on the other hand, maintained that "the city continues to work closely with the MDEQ and the EPA Regional Office."

As for Walters's family, that the city has finally replaced the service line leading to their home, and lead levels have dropped below the 15 ppb EPA action level.

The problem now, she said, is that water currently coming out of her tap tinged yellow and smells of rotten eggs. City officials have given her no explanation as to the possible cause of that.

It is just one more in a long list of questions that need to be addressed.

"What we need," said Walters, "are more answers."

But it's not just answers the people of Flint require.

They also need solutions. And, as Del Toral's EPA memo emphasizes, they need them immediately.



Read more: Michigan Democracy Watch Project (http://www.aclumich.org/democracywatch/index.php/entry/corrosive-impact-leaded-water-and-one-flint-family-s-toxic-nightmare)

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GP For Life • 3 months ago

"The problem now, she said, is that water currently coming out of her tap tinged yellow and smells of rotten eggs."

I almost positive that is sulfur contamination. Good news is that it has to be crazy high before any permanent negative health effects occur. http://www.ianrpubs.unl.edu/ep...

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George T. > GP For Life • 3 months ago

The water is contaminated with all kinds of waste industrial chemicals. Water users have had theirs tested independently. Read up on the topic.

△ ▽ • Reply • Share ›



Rick Thompson • 3 months ago

Curt, I am very glad to see you working for the ACLU of Michigan! This article is a great example of how media and responsible citizenry can work together to make positive impacts in our communities. As a Flint resident, I'm outraged and shocked- and ready to get MY water tested! I'm on that city system.

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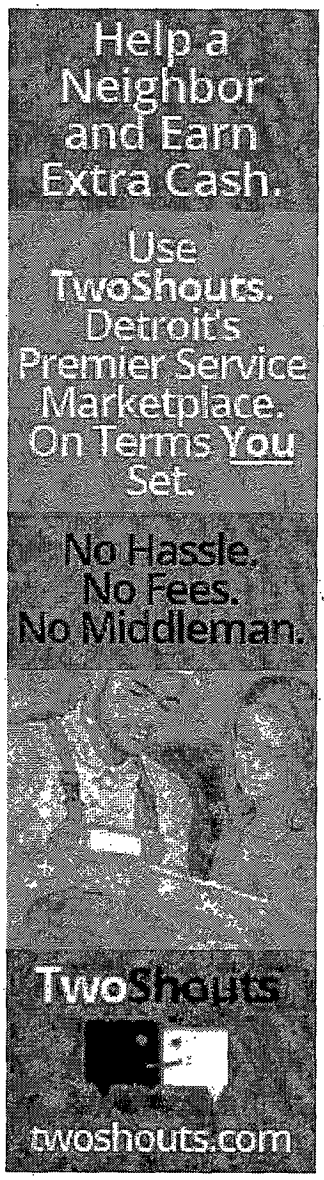
Trexinmichigan > Rick Thompson • 3 months ago

Good luck Rick.

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Results from Field Sampling in Flint (Aug 17-19 2015) : Opportunistic Pathogens #2

September 9, 2015 (http://flintwaterstudy.org/2015/09/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens-2/) Siddhartha Roy (http://flintwaterstudy.org/author/flintwaterstudy/) Articles (http://flintwaterstudy.org/category/articles/), Research Updates (http://flintwaterstudy.org/category/research-updates/) biofilms (http://flintwaterstudy.org/tag/biofilms/), flint water (http://flintwaterstudy.org/tag/flint-water/), legionella (http://flintwaterstudy.org/tag/legionella/), legionnaire's disease (http://flintwaterstudy.org/tag/legionnaires-disease/), opportunistic pathogens (http://flintwaterstudy.org/tag/opportunistic-pathogens/), qpcr (http://flintwaterstudy.org/tag/qpcr/)

Report 5. *Additional Testing for Opportunistic Pathogens*

During our recent sampling trip to Flint on August 17-19 (http://flintwaterstudy.org/2015/09/our-flint-sampling-trip-aug-17-19-2015/), we collected samples to analyze for the presence of Opportunistic Pathogens (OPs) (http://flintwaterstudy.org/2015/08/opportunistic-pathogens/). We reported previously that we did not find evidence to indicate that the OPs (http://flintwaterstudy.org/2015/08/results-from-field-

sampling-in-flint-aug-17-19-2015-opportunistic-pathogens/) *Legionella pneumophila*, which may cause Legionnaire's Disease, or *Mycobacterium avium*, were present in any of the samples we collected.

During our trip, we collected samples (http://flintwaterstudy.org/2015/09/our-flint-sampling-trip-aug-17-19-2015/) from nine businesses located throughout the city of Flint, including eight of Flint's designated monitoring sites and a business located in close proximity to the drinking water treatment plant, and seven homes of Flint water consumers. For comparison, we also collected water from four businesses that receive water from Detroit. At each of these sites, we collected both water samples and swabs of bacteria growing on the surface within the faucet, known as the biofilm (http://www.colgateprofessional.com/patient-education/articles/what-is-biofilm).

Here we report on our results for several additional OPs, alongside the previous results, based on presence of DNA markers specific to each bacterium. Pathogenic species are indicated in red. *Mycobacterium* spp. represents a genus of bacteria that includes several pathogenic and non-pathogenic species. *Vermamoeba vermiformis* is of interest because it is an amoeba that may play an important role in the life cycle of some pathogens, such as *Legionella pneumophila*. In addition, we attempted to culture pathogenic *Staphylococcus* species from the samples.

Results:

		Acanthamoeba polyphaga	*Vermamoeba vermiformis*	*Pseudomonas aeruginosa*	*Mycobacterium spp.*	*Mycobacterium avium*	*Legionella spp.*	*Legionella pneumophila*
Flint Businesses Positive* (n=9)	Water	0	2	0	4	0	2	0
	Biofilm	1	2	0	5	0	1	0
Flint Homes Positive* (n=7)	Water	0	4	0	5	0	5	0
	Biofilm	2	2	0	3	0	1	0
Detroit Water Businesses Positive* (n=4)	Water	0	0	0	2	0	0	0
	Biofilm	0	2	1	3	0	0	0

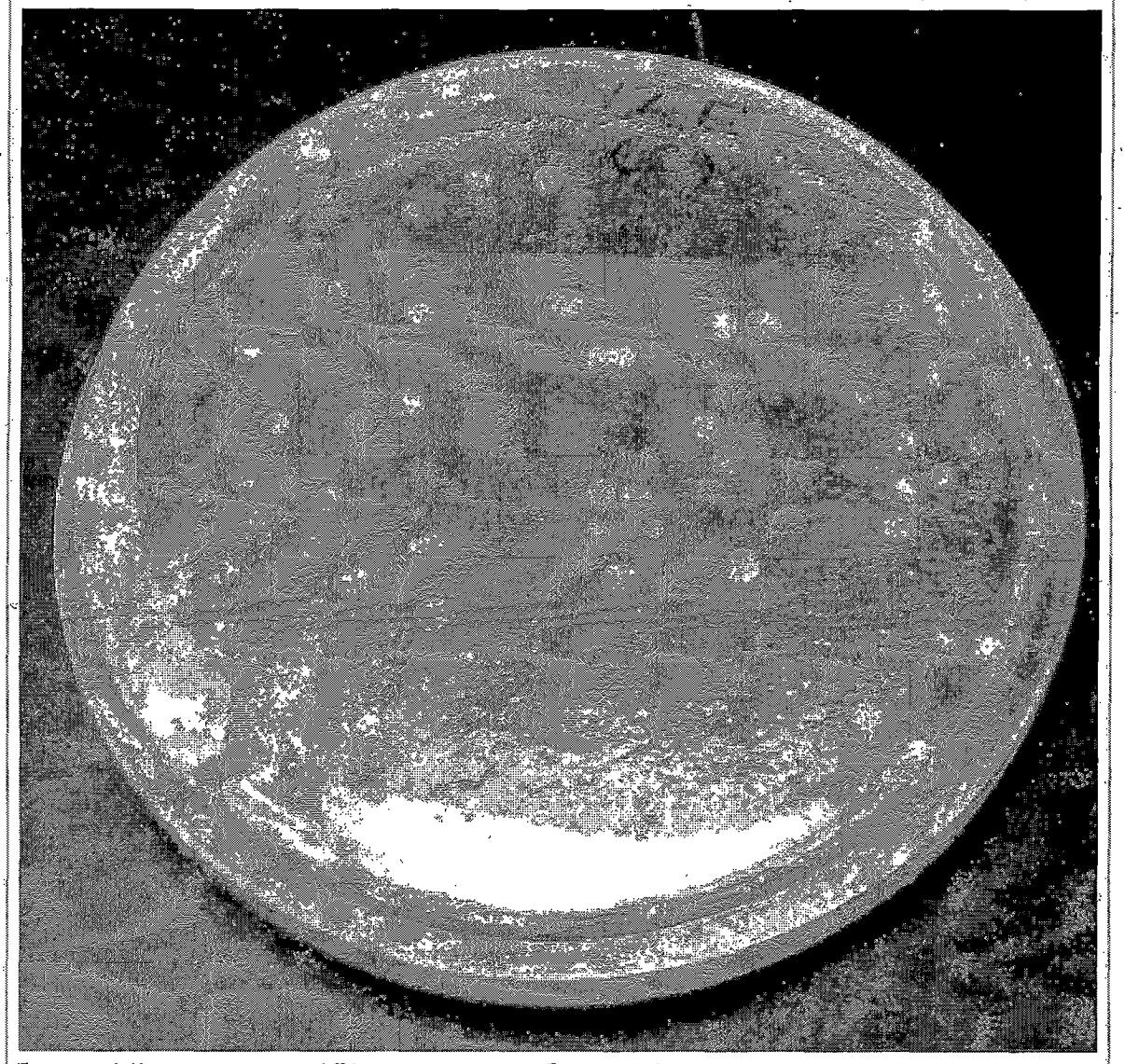
*Positives are defined as samples from which quantities were greater than our lowest standard which amplified in triplicate: 10 copies / mL in water and 10,000 total copies per biofilm swab for all targets except *A. polyphaga* and *P. aeruginosa* which are 100 copies / mL in water and 100,000 total copies per biofilm swab.

(http://i2.wp.com/flintwaterstudy.org/wp-content/uploads/2015/09/tab.png)

Table 1: Frequency of detection of several Opportunistic Pathogens (shown in red) and additional microbes of interest that are not necessarily pathogenic (shown in black)

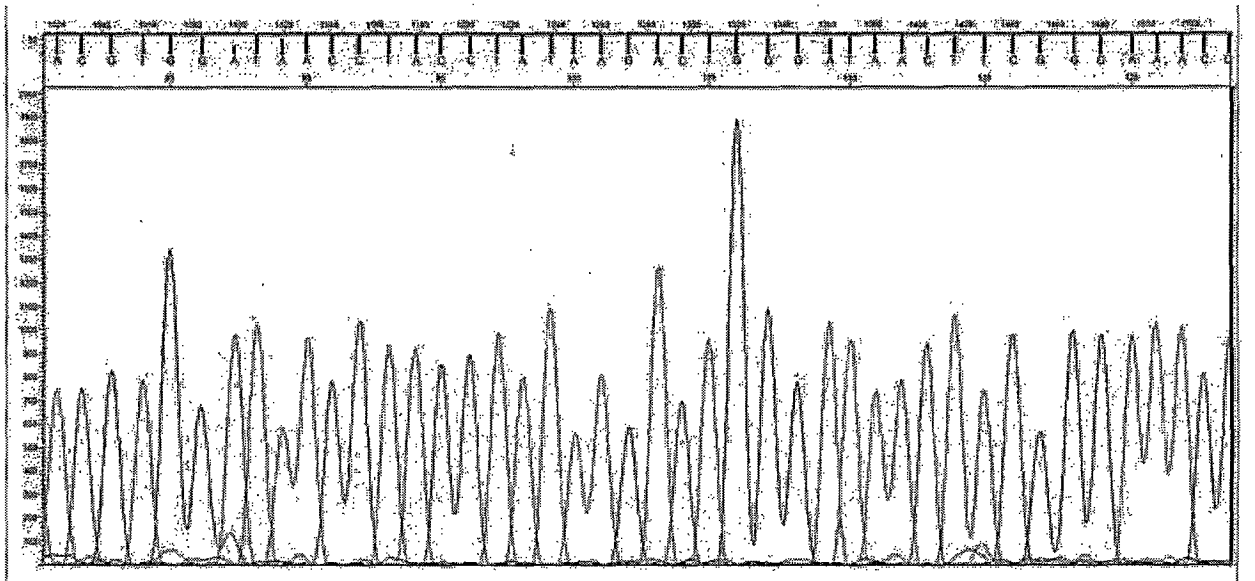
Table 1 demonstrates that we did not detect quantifiable levels of *Pseudomonas aeruginosa, Legionella pneumophila, or Mycobacterium avium* in water or biofilm samples collected from any of the sixteen sites in Flint. *Acanthamoeba polyphaga* was found in the biofilm at 3 sites in Flint. *Acanthamoeba polyphaga* is an amoeba that is often associated with eye infections of individuals using tap water for contact lens care rather than sterile saline, but has also been associated with skin and respiratory infections. More information on this amoeba can be found here (http://www.cdc.gov/parasites/acanthamoeba/).

Water from each site was also cultured using methods specific to growing *Staphylococcus*. Only two sites resulted in *Staphylococcus* growth. DNA from 10% of the resulting colonies were sequenced to identify the species. All sequences were identified to belong to either *Staphylococcus epidermidis* or *Staphylococcus hominis*. Both species are frequently found on the skin of healthy individuals and are not typically pathogenic.



(http://i2.wp.com/flintwaterstudy.org/wp-content/uploads/2015/09/culturing.jpg)

Figure 1: Culturing Staphylococcus spp. revealed species of the bacterium that are not typically pathogenic



(http://i2.wp.com/flintwaterstudy.org/wp-content/uploads/2015/09/sanger.png)

Figure 2: A method known as Sanger Sequencing was used to identify species of Staphylococcus based on unique patterns in the bacterium's DNA. An example of the sequencing output is shown here. Each colored peak represents a fluorescent signal and corresponds to a different letter in the DNA sequence, which can be seen at the top of the display.

Conclusion:

Although the number of samples collected has been small and were collected from each site on a single date, our results do not indicate the presence of pathogenic OPs in Flint water, with the exception of sporadic detection of *Acanthamoeba polyphaga* in biofilm samples. Overall, this limited sampling, indicates that **from a microbiological perspective Flint water does not seem to pose a health risk worse than many other U.S. cities that we have sampled**. However, the chronically low chlorine residuals throughout the distribution system, suggest that this issue should be the subject of continued scrutiny.

Additional Notes: The method we used to quantify the pathogens is called quantitative polymerase chain reaction (qPCR). It works by detecting DNA specific to the target microorganisms, making the method very specific, but also very sensitive, as an organism does not necessarily need to be alive or culturable for us to identify that it is present. The minimum threshold of target bacteria, or more accurately the bacteria's DNA that must be present in the 1-liter samples that we collected is 10 DNA copies per mL or 10^4 copies in the entire swabbed biofilm. This is the best available and most sensitive method of OPs detection.

Analysis and write-up: Emily Garner

Acknowledgements: Dr. Marc Edwards and Dr. Amy Pruden

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2 thoughts on "**Results from Field Sampling in Flint (Aug 17-19 2015) : Opportunistic Pathogens #2**"

Marjorie
September 9, 2015 at 10:08 pm (http://flintwaterstudy.org/2015/09/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens-2/#comment-65)

Why did you only sequence the DNA from 10% of the colonies?

Reply (http://flintwaterstudy.org/2015/09/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens-2/?replytocom=65#respond)

Siddhartha Roy
September 10, 2015 at 1:57 pm (http://flintwaterstudy.org/2015/09/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens-2/#comment-68)

To go a little more in depth about the process, we actually did an "enrichment" step before growing the Staphylococcus on agar. Plating bacteria directly onto agar from an environmental sample can sometimes be a bit of a shock to the cells and they don't always grow. This has been documented to be the case for some Staphylococcus species, so we added the enrichment step, meaning we first grew cells from the Flint water samples in Staphylococcus-specific nutrient broth. We then plated the broth onto agar and isolated individual colonies from there. The result of this incubation in broth is that many cells will have resulted from each Staphylococcus cell that was present in our water sample. Therefore, it's not feasible to sequence every possible

isolate and it likely isn't giving us any new information to sequence every single one. We did include some steps based on how the colonies look on agar and how they react with certain chemicals to screen the isolates so that we could have added certainty that the 10% of isolates we sequenced were capturing any variation we were seeing between the different isolates. For example, different species of Staphylococcus will result in different colored colonies on the agar, so the fact that we did not see the yellow-orange colonies that are typical of pathogenic Staphylococcus was also an indication that the colonies were not likely to be pathogenic.
– Emily

Reply (http://flintwaterstudy.org/2015/09/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens-2/?replytocom=68#respond)

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(https://www.reddit.com/r/IAmA/comments/3x7wr7/flintwaterstudy_the_indepen

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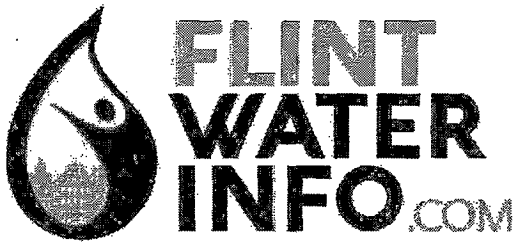
FUNDRAISING CAMPAIGN TO BUY LEAD FILTERS FOR FLINT RESIDENTS

We thank the **68** generous contributors who helped raise **$4,345** through our **SafeWater4Flint** fundraising campaign.The funds have been donated to the United Way of Genesee County (http://www.unitedwaygenesee.org/civicrm/contribute/transact?reset=1&id=5) who are spearheading filter distribution in Flint. You can donate directly to United Way on their donation page here (http://www.unitedwaygenesee.org/civicrm/contribute/transact?reset=1&id=5).

INFORMING FLINT RESIDENTS ABOUT LEAD IN THEIR WATER

All Flint residents who returned their lead kits will receive their results via regular mail. You will also receive this document on how to interpret your lead results (http://flintwaterstudy.org/wp-content/uploads/2015/08/interpretation.pdf). For the **277** lead kits analyzed so far, we have finished calling residents who had considerably high lead in their water.

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A. Project Summary

Overview: Flint, MI, is currently suffering from a "perfect storm" attributable to out-of-control corrosion of its potable water distribution system. The corrosion is undermining water affordability for residents, financial viability of city government, water aesthetics, and hygiene/sanitation as revealed in local and national news reporting. We ***hypothesize*** that these circumstances will also create severe chemical/biological health risks for Flint residents, including elevated levels of lead and opportunistic premise plumbing pathogens (OPPPs) in drinking water. Preliminary data collected from a home of a lead poisoned child in Flint has revealed extraordinarily high levels of lead, with average concentrations over 20 minutes of water use exceeding 2,000 ppb (> 200 times the World Health Organization allowable levels for lead in potable water).

The main ***objectives*** of this research are to: 1) compare levels of chlorine, iron, fecal indicator bacteria, OPPPs, and corrosion-inducing bacteria present in water mains of a distribution system with uncontrolled corrosion (Flint) versus surrounding cities/counties still using non-corrosive water, 2) profile OPPPs occurrence in hot and cold potable water systems at these same locations, and 3) determine if there is evidence of elevated lead in Flint homes, and, if so, forensically determine the links to iron corrosion. Our team is uniquely qualified to do this work given our just published peer reviewed research on this subject and our extensive collaborations with key stakeholders in Flint.

Intellectual Merit: The four elements of the "perfect storm" currently undermining water quality (and possibly public health) in Flint include: a) chronic underinvestment in water infrastructure, b) under-appreciation of the role of corrosion control in sustaining urban potable water systems, c) increased corrosion due to higher chloride in Flint's new source water, and d) failure to appropriately monitor for lead and OPPPs. The latter two factors are amongst the most important health problems arising in modern potable water systems. The high rates of corrosion occurring in Flint are releasing high levels of iron to water and consuming chlorine disinfectant, which our most recent laboratory testing has indicated will increase lead release to water and growth of OPPPs in cold and hot water plumbing systems. The unfortunate but unique opportunity offered by Flint's current situation, provides an ideal opportunity to field test our recent discoveries regarding potentially adverse consequences of iron corrosion on chemical/microbiological water quality at field rather than laboratory scale.

Broader Impacts: This RAPID grant will directly assist residents of Flint in assessing the current safety of their potable water supply. If the results support recently issued public assurances regarding safety of water, the current problems in Flint can be considered mainly of aesthetics and perception due to very distasteful or discolored water. However, if sampling reveals widespread problems, the public will learn of the potential health threat. Since elements of the "perfect storm" afflicting Flint are occurring at some level in many other financially stressed U.S. urban centers with decaying drinking water infrastructure, this Rapid Response Research (RAPID) grant also provides an unprecedented opportunity to advance fundamental scientific and practical understanding at this emerging nexus of infrastructure-environmental engineering-public health. The general results and approach used herein can inform residents and managers of other U.S. cities, who will soon be dealing with similar problems associated with failing potable water infrastructure exacerbated by increased chloride in water due to excessive use of road salt and rising sea levels. The research also provides a compelling case study in *Citizen Science*, since the experiences of Flint parents in monitoring their children's health and environmental exposures was a trigger for our preliminary testing, and Flint consumers will be scientifically empowered by participating in fundamental research relying on collection of samples from their homes and residences. There is also a social justice implication of the research, in that these results can help inform the current policy debate regarding strategies for dealing with cites that have gone bankrupt, as well as the discussion of access to safe and affordable drinking water as a basic human right.

RAPID: Synergistic Impacts of Corrosive Water and Interrupted Corrosion Control on Chemical/Microbiological Water Quality: Flint, MI

1. Problem Statement and Objectives

Flint, MI, is currently suffering from a "perfect storm" due to out-of-control corrosion of its potable water distribution system, undermining the well-being of the community including water affordability for residents, financial viability of city government, water aesthetics, and hygiene/sanitation.[1-13] Flint's problems began in April 2014, when emergency managers hired to deal with the city's fiscal crisis determined they could save money by switching to a local river water source as opposed to purchasing water from Detroit (Table 1). As a result of the change in source water, the Larson Iron Corrosion Index was raised from 0.54 (low corrosion) to 2.3 (very high corrosion) and the chloride to sulfate mass ratio (CSMR) index for lead corrosion increased from 0.45 (low corrosion) to 1.6 (very high corrosion). Concurrently, the managers and state primacy agency attempted to save even more money by not feeding an orthophosphate corrosion inhibitor to the water supply (Table 1).

Table 1. Water quality parameters for drinking water supplied in Flint, MI before and after the April 2014 switch

Parameter	Before[1]	After[2]
pH	7.38	7.61
Hardness (mg/L as $CaCO_3$)	101	183
Alkalinity (mg/L as $CaCO_3$)	78	77
Chloride (mg/L)	**11.4**	**92**
Sulfate (mg/L)	25.2	41
CSMR[3]	0.45	**1.6**
Inhibitor (mg/L as P)	0.35	**NONE**
Larson Ratio[4]	0.5	**2.3**

[1]Source: City of Flint Monthly Operation Report, June 2015. Available from www.cityofflint.com
[2]Source: DWSD 2014 Water Quality Report. Available from www.dwsd.org
[3]A measure of corrosivity to lead; a value > 0.5 is a critical trigger [10]
[4]A measure of corrosivity to mild steel and iron; corrosion rate increases linearly with Larson Ratio [8]

Not surprisingly, the combined effect of more corrosive water and removal of the corrosion inhibitor unleashed unprecedented corrosion in the water main distribution system with cascading personal, economic, and public health consequences to Flint as tracked by news reports and mandatory chemical/biological monitoring of water in the distribution system mains.[1-14] ***Our recent research also predicts that these circumstances will potentially create severe chemical/biological health risks for residents, due to impacts on water within building (premise) plumbing systems that include elevated levels of lead and opportunistic premise plumbing pathogens (OPPPs).***[15-18] Because the factors impacting Flint are also occurring at some level in many other financially-stressed U.S. urban centers with decaying drinking water infrastructure, this ***Rapid Response Research (RAPID) grant provides an unprecedented opportunity to advance fundamental scientific and practical understanding at this emerging nexus of infrastructure-environmental engineering-public health.*** We view August-September 2015 as the ideal time to first sample in Flint, as more than 16 months of uncontrolled corrosion have occurred and the water remains near its seasonal peak temperature, maximizing the likelihood of serious problems with lead and OPPPs if they exist.

Our key hypothesis is that the rapid corrosion of iron water mains will dramatically increase lead release to water and growth of OPPPs as measured in consumers' homes. Mechanistically, higher iron corrosion produces both higher iron in water and lower levels of free chlorine, both of which dramatically increased lead release and OPPPs regrowth in our just published laboratory research utilizing simulated distribution systems.[15-19] The ***main objectives of this research*** are to: *1) compare levels of chlorine, iron, fecal indicator bacteria, OPPPs, and corrosion-inducing bacteria present in water mains of a distribution system with uncontrolled corrosion (Flint) versus controlled corrosion in surrounding cities/counties still using non-corrosive Detroit water, 2) profile hot and cold potable water systems at the same sampling locations in #1 for OPPPs, and 3) determine if there is evidence of elevated lead in Flint homes, and, if so, forensically determine the links to iron corrosion.*[15,17-20] The unfortunate but unique opportunity offered by Flint's current situation provides an ideal opportunity to field test our recent discoveries regarding adverse consequences of iron corrosion on OPPPs and lead concentration at the tap.

2. Review of Local Events and Intellectual Merit

Local Impacts. After the switch of water sources, residents of Flint were immediately subject to an outbreak of corrosion-related drinking water problems including flooding from large water main breaks and reported health ailments.[1-6] General Motors, a prime customer of the water system, reported that the new water was severely corroding auto parts on its assembly line and had to begin importing water, costing the city $400,000 in lost revenue.[9] The PI was also alerted by an Environmental Protection Agency volunteer to a case of childhood lead poisoning in a Flint home that was certified as "lead free."[4] Samples collected from the home exhibited classic "red water" that is occurring throughout the city (Figure 1), along with the highest sustained levels of lead in drinking water that we have encountered in over 25 years of research on the subject. Specifically, in 30 samples collected over a period of 25 minutes flushing at the kitchen faucet, lead concentrations averaged over 2,000 ppb and were as high as 13,000 ppb. For perspective, these levels are more than 200-1,300 times higher than World Health Organization standards (10 ppb) and several even exceeded the EPA criterion for "hazardous waste" of 5,000 ppb Pb. The city has also reported unspecified economic losses due to water main breaks and water losses through leaks.[3,7,11-12]



Figure 1. Drinking water samples collected from home of a child who was lead poisoned by Flint water.

The corrosion problems have also had cascading impacts on health parameters monitored under federal regulations. Because the corrosion is rapidly consuming chlorine disinfectant in the water, the city violated EPA limits for *E. coli*.[5-6] The detaching iron rust also has the potential to expose consumers to other contaminants that pose a serious public health risk, including arsenic[14] and lead that have accumulated in pipes or sorbed to iron surfaces.[15-16] Health effects reported by residents since the switch include skin rashes, hair loss, vomiting, copper poisoning, and the one confirmed case of lead poisoning.[2-4,7,13] However, the relatively small number of cases reported to date almost certainly underestimates the full extent of the problem. In response to the sampling showing high lead, the authorities who made the decision to switch water sources and stop adding corrosion inhibitor publicly stated that "anyone who is concerned about lead in the drinking water in Flint can relax" and that the water is safe,[44] but refuse to sample consumers' water without pre-flushing the plumbing for at least 5 minutes the night before sampling. The latter practice is known to miss lead in water problems.

We are also concerned about possible health effects that have not yet been investigated. For example, in March 2015 Region 5 EPA was provided reports of higher incidence of Legionnaires' disease associated with bacteria growth in premise plumbing in the Flint area.[21] Legionnaires' disease has recently been acknowledged to be the primary source of waterborne disease outbreaks (and associated deaths) in the U.S.[22] Despite that acknowledged risk, there is currently no required monitoring for this important pathogen in consumers' homes, where it proliferates and can lead to human exposure and infection in showers.[22]

Intellectual Merit. The four elements of the "perfect storm" currently undermining water quality (and possibly public health) in Flint include: a) chronic underinvestment in water infrastructure, b) under-appreciation of the role of corrosion control in sustaining urban potable water systems, c) increased corrosivity of water sources nationally due to rising chloride levels from anthropogenic pollution and/or rising sea levels, and d) failure to appropriately monitor for lead and OPPPs, which are two of the most important modern-day public health problems arising in building plumbing systems.

a) **Chronic Underinvestment in Water Infrastructure.** A large fraction of the nation's potable water infrastructure is on the verge of failure, and this problem has been repeatedly voted by

members of the American Society of Civil Engineers (ASCE) as the most urgent societal infrastructure challenge with an overall condition grade of "D".[23,24] Many water main distribution systems are reaching the end of their design lifetime (60-95 years), with water main breaks currently at a rate of 240,000 per year nationally and rising.[25,26] Aside from obvious public health implications associated with compromised delivery of uncontaminated drinking water to the tap, failure events can cause property damage and water loss through leaks.[27] Like many post-industrial manufacturing centers, Flint has a very large potable distribution system constructed to sustain a large consumer and industrial base that no longer exists. The projected cost to upgrade the distribution system is $1.5 billion dollars,[28] which would translate to an unbearable cost of $50,000 per existing customer in Flint.[28]

b) **Under-appreciation of the role of corrosion control in sustaining potable water systems.** Estimates by ASCE, the American Water Works Association (AWWA), the Environmental Protection Agency (EPA), the Water Infrastructure Network (WIN), and the National Academy of Corrosion Engineers (NACE) suggest that direct costs of water pipeline corrosion range between $8 billion - $36 billion annually and indirect costs are much higher.[27] Leaks result in 7 billion gallons of lost water each day with associated revenue losses of ≈ $3 billion per year for U.S. utilities.[29] Problems with leaking potable water plumbing systems in buildings (i.e. premise plumbing) also cost consumers billions of dollars each year.[30,31] Water utilities can reduce costs of potable water system corrosion and extend the lifetime of these invaluable assets by adding corrosion inhibitors, such as orthophosphate, to the water. Prior research using a relatively low corrosivity source water determined that each dollar invested in corrosion control produced more than $5 dollars in financial savings due to reduced corrosion damage and extended lifetime of pipeline infrastructure.[32] In Flint, the short-sighted decision to reduce chemical costs by removing the corrosion inhibitor and introducing corrosive water to the system may have produced tens if not hundreds of millions of dollars in corrosion damages to its existing potable water distribution system. We are also aware of many other utilities that are cutting back on their corrosion inhibitor doses due to cost-cutting pressures.

c) ***Increased corrosivity of water sources nationally due to rising chloride levels from anthropogenic pollution and/or rising sea levels.*** Chloride levels in drinking water are rising nationally in surface water due to use of road salt and seawater intrusion in coastal regions. Road salt use in winter has risen to 137 lbs per year for every American, with a doubling of salt application from 1990 to 2014 (10 vs. 22 million tons) associated with a doubling of chloride levels in northern U.S. waters as monitored by the USGS.[33,34] There is documented concern about the damage of salt application to infrastructure such as roads and bridges,[35] but rising salt levels in the Potomac (due to road salt) in 2015 also have triggered a spike in consumer complaints of red or brown water from their main distribution system.[36,37] and we are currently working with a utility in Brick, NJ that is reporting high lead in consumers' water due to higher chloride from rising sea levels near their intake as well as road salt use.[38-40] The higher corrosivity of water in Flint due to higher chloride (Table 1), therefore provides an interesting "acute" case study of higher chloride impacts that can shed light on these important national trends.

d) ***Failure of utilities and regulatory agencies to take responsibility for the two most important modern day public health problems arising in building plumbing systems (i.e., lead and OPPPs).*** For ten years EPA has acknowledged that utilities are collecting samples in a manner that "misses" worst case lead in water,[41-43] and to date they have not required utilities to change monitoring practices to better reveal problems. The EPA LCR sampling protocols have been under review since 2008 and the EPA is expected to issue new requirements sometime in 2016. Hence, sampling in Flint without "pre-flushing" to reduce lead, as revealed by the EPA

volunteer,[4] could inform modifications to the EPA LCR. Likewise, EPA's current regulations on Legionella consider only levels that might be present in water leaving the treatment plant, where it is least likely to be present, and do not yet require monitoring at the point of entry into homes or within buildings where Legionella is most likely to be present and cause disease.[21] Our proposed sampling for Legionella at these locations can therefore inform future regulation and distribution system management policies for dealing with this emerging public health risk.[19,22]

In summary, this proposed RAPID grant characterizing the occurrence of chemical/biological problems in Flint, MI homes explores a newly emerging nexus between degrading infrastructure-environmental engineering-public health that can provide insight into problems facing many cities all over the United States.

3. Approach

The ***RAPID grant objectives*** will be achieved through three phases of sampling, using analytical methods in routine use by the project team, as follows:

Phase 1. Compare levels of chlorine, iron, fecal indicator bacteria, OPPPs, and corrosion-inducing bacteria present in water mains of a distribution system with uncontrolled corrosion (Flint) versus controlled corrosion in surrounding cities/counties still using non-corrosive Detroit water. A team including the PI and at least 3 graduate students will travel to Flint and stay 3-7 days in mid-August 2015, to collect 8 distribution system samples from surrounding cities still using Detroit water, and to also sample Flint's 8 distribution system monitoring locations (Figure 1). We will stay in two hotel rooms, one located in Flint and one in a surrounding location on Detroit water, to conveniently collect samples for free chlorine at 2 hour intervals expected to correspond to lowest and highest daily demand. All of these analyses will be conducted using standard methods with the exception of testing for corrosion-inducing bacteria which will be conducted with Biological Activity Reaction Test (BART) kits. BARTs are standardized colorimetric culture kits that are semi-quantitative and include testing for Sulfate-Reducing Bacteria (SRB), Heterotrophic Aerobic Bacteria, Heterotrophic Anaerobic Bacteria, Denitrifiers, Slime Forming Bacteria, and Acid Producing Bacteria (APB). It is hypothesized that the Flint waters will have much lower levels of free chlorine, higher levels of iron, corrosion-inducing bacteria, and fecal indicator bacteria than samples collected from locations still on Detroit water.

Phase 2. Profile building hot and cold water plumbing systems for OPPPs at the same sampling locations used in Phase 1. Protocols used previously to sample for a suite of OPPPs and two host protozoa[18,20] in hot and cold water from taps and biofilms of buildings using quantitative Polymerase Chain Reaction (q-PCR) analysis, will be used to profile the hot and cold water systems for human pathogens at the same locations tested in Phase 1. Specifically, target microbes including *Legionella pneumophila, M. avium, P. aeruginosa, Acanthamoeba and Vermamoeba vermiformis* will be quantified by qPCR, and hot water samples will be cultured for *Legionella* and

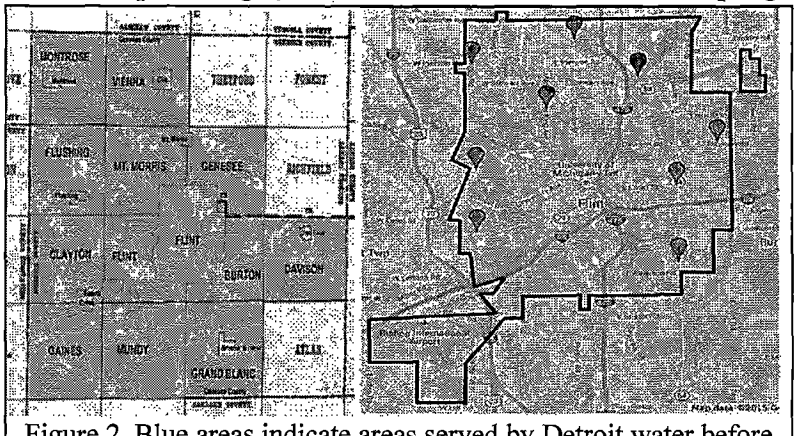


Figure 2. Blue areas indicate areas served by Detroit water before the city of Flint switched (left) and distribution of Flint monitoring stations (right).

Mycobacteria from each location. Samples collected for microbial analysis and fecal indicator bacteria (Phase 1) will be overnight shipped from Michigan via cold-pack using protocols developed by the project team on NSF Project CBET-1438328. In Flint, for comparison, at least three additional privately owned homes will be sampled for OPPPs using the same protocols as for the public buildings.

Phase 3. Determine if there is evidence of elevated lead in Flint homes. We will coordinate with several local citizen groups including the American Civil Liberties Union (ACLU), **Concerned Pastors for Social Action,** and others to sample homes in Flint for lead in water. We will prepare 300 sampling kits with instructions, to collect water samples according to standard EPA LCR protocols for shipment to community groups. Each kit will contain three bottles to sample water after standard water stagnation (> 6 hours) at typical-use flow rates, including 1) first draw standard LCR (1 liter), 2) 45 second flushing 0.5 liter sample (targeting the lead service line, if present), and 3) 5 minutes of flushing 0.25 liter sample. Each kit will have a sample form to fill out information including 1) name of person collecting sample, 2) age of home (if known), 3) mailing address of home sampled, and 4) date of sample collection. A phone number will be provided of a member of the Virginia Tech team, who can answer questions that residents have about the instructions (if any). Residents will be instructed to return the sampling kits to a centralized location according to procedures that best suit each citizen group. The sample kits will then be put into boxes provided by the project team, and shipped back to Virginia Tech with the postage paid by the RAPID grant. Assuming a response rate of 33%, 300 samples (= 0.33 X 300 X 3 bottles per kit) will be analyzed for lead, iron, copper and other constituents using the PI's Inductively Coupled Plasma Mass Spectrometer (ICP-MS). All returned kits will be analyzed, and results will be summarized in a letter to each consumer to be sent out within 1 month of receiving the samples. We will provide a phone number of a senior research scientist (Dr. Jeff Parks) that the residents can call to ask questions about their results if they have them and compile the results in a summary form for research publications and public outreach.

4. Project Management and Prior NSF Support

The senior project team (Edwards, Pruden, Falkinham) has collaborated together extensively and has a strong record of success. They will be assisted in leading the project by Dr. Brandi Clark (former NSF graduate fellow) who is a recent graduate of Virginia Tech (2015). Edwards and Clark will coordinate the Flint site visit and the lead survey. Another NSF graduate fellow (Emily Garner, formerly Emily Lipscomb) who is currently co-advised by Pruden/Edwards will assist the Flint site visit team and coordinate biological sample analysis and shipments. Pruden and Falkinham will assist in the data analysis, interpretation and write-up of the results.

5. Broader Impacts

In addition to improving practical and scientific understanding related to two of the most important problems associated with potable water and health in consumer homes (i.e., lead and OPPPs), this RAPID grant will directly assist residents of Flint in assessing the safety of their potable water supply. The results and approach used herein can inform residents and managers of other U.S. cities who will soon be dealing with similar problems associated with failing potable water infrastructure and increased corrosivity of potable water. Phase 3 of this research also provides an interesting case study in *Citizen Science* as a tool to advance scientific understanding, policy, and public health, because consumers are actively collecting samples from their homes and will be participating in National Science Foundation research. The work also has social justice implications, as the plight of Flint residents has already received national attention, and results can inform the current debate regarding access to safe, affordable water as a "right" for Americans in U.S. cities.

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Shekter Smith, Liane (DEQ)

From: Krisztian, George (DEQ)
Sent: Friday, October 16, 2015 6:54 AM
To: Sygo, Jim (DEQ); Wyant, Dan (DEQ); Wurfel, Brad (DEQ); Shekter Smith, Liane (DEQ)
Cc: Thelen, Mary Beth (DEQ); Shaler, Karen (DEQ)
Subject: FW: 3rd Quarter Water Report

FYI

George L. Krisztian
Flint Action Plan Coordinator
Laboratory Director
Michigan Department of Environmental Quality
Desk ph (517) 284-6719
Cell ph (517) 204-0381

From: Marc Edwards [mailto:edwardsm@vt.edu]
Sent: Thursday, October 15, 2015 7:29 PM
To: 'Howard Croft'; 'Laura Sullivan'
Cc: 'Gerald (Jed) Natzke'; 'Andy Leavitt'; 'Amy Hovey'; 'Brent Wright'; 'Lytle, Darren'; 'Flint Mayor'; 'donna.cole'; Dykema, Linda D. (DHHS); Krisztian, George (DEQ); 'Henry, James'; 'James Gaskin'; 'Jason Lorenz'; 'jmikewright'; 'JoAnne Herman'; 'John O'Brien'; 'Kirk Smith'; larry.koehler@mcc.edu; 'Lawrence Reynolds'; 'Lawrence Reynolds'; 'Michael Glasgow'; 'Wright, Michael'; 'Lane, Mike'; Prysby, Mike (DEQ); 'Natasha Henderson'; 'Norb Birchmeier'; 'Pete Levine'; 'Robert Bincsik'; rosejo@msu.edu; 'Russell Hudson'; 'Samir Matta'; schock.michael@epa.gov; 'Sean Kammer'; Busch, Stephen (DEQ); 'Warren Green'; Wurfel, Brad (DEQ); 'Anthony Chubb'; 'Kevin Keane'
Subject: RE: 3rd Quarter Water Report

I have gotten a lot of questions about this., so figured I would answer in one e-mail.

The city is still using the MDEQ sampling approach. That method takes the EPA sampling method, and adds two modifications, both of which are technically legal, but "miss" lead in water that is normally present when people use it. I have been trying to get these modifications banned since 2007, because they give a false low measurement of lead in water risks on the day you sample. As a result, a city can be meeting the EPA rule, technically, and still have a huge problem with elevated blood lead in children.

The two modifications are:

1) **Using a sample bottle with a tiny opening**. This forces consumers to fill the bottles at a very low flow rate. The net effect of this, is that particulate Pb that would normally flow into a consumers water glass at a normal flow rate, stays on the pipe when you sample for lead. When a consumer fills a glass or collects water for drinking, the particles fall off.
2) **Pre-cleaning the pipes the night before sampling (aka. Pre-flush).** This basically remediates and sweeps the pipe clean of lead the night before sampling, so that the next morning when you sample, you get unusually low lead. The sampling protocol used by MDEQ requires a **5 minute pre-cleaning.**

When Virginia Tech sampled in Flint, we used the EPA protocol, without the modifications that miss lead in water problems.

I hope this explains the discrepancy. The MDEQ approach could give people a result for 0 ppb lead in water, and when they collect a sample for cooking or drinking it can be 100 ppb. I have seen it happen. **No one who is getting a low result using the MDEQ approach, should be told their water is safe to drink.** The result is meaningless. If it is high with

the MDEQ approach, you have a very, very serious problem. MDEQ is also not the only primacy agency in the country using these methods that miss lead, so **I am not blaming anyone, I am just stating the facts.**

Miguel Del Toral of EPA warned MDEQ to stop using this method back in Apri-May in writing, because it would hide a lead problem if they existed, and they basically told him to mind his own business. I also asserted that Miguel was right, in the ACLU report in June. http://www.deadlinedetroit.com/articles/12697/scary_leaded_water_and_one_flint_family_s_toxic_nightmare#.ViA1Zn7nvIU

Best Regards, Marc

Menu

Home (http://flintwaterstudy.org/) » Posts tagged 'opportunistic pathogens'

OPPORTUNISTIC PATHOGENS

Initial Frequently Asked Questions (FAQ) regarding Legionella bacteria in present-day Flint (http://flintwaterstudy.org/2016/01/initial-frequently-asked-questions-faq-regarding-legionella-bacteria-in-present-day-flint/)

January 13, 2016 (http://flintwaterstudy.org/2016/01/initial-frequently-asked-questions-faq-regarding-legionella-bacteria-in-present-day-flint/) Articles (http://flintwaterstudy.org/category/articles/), Research Updates (http://flintwaterstudy.org/category/research-updates/) chlorine (http://flintwaterstudy.org/tag/chlorine/), legionella (http://flintwaterstudy.org/tag/legionella/), opportunistic pathogens (http://flintwaterstudy.org/tag/opportunistic-pathogens/)

We have been getting questions from concerned parents about the Legionella announcement made earlier today and if there is a risk to taking showers.

1. Is it safe for me and my kids to shower in the water now?

A. We agree with DHHS that this problem, is probably behind us all, even it if was caused by the Flint River water. It is safe to shower now whether you are an adult or a child. When we say "safe," we mean it is no riskier to shower in Flint now than in any other U.S. city.

2. Is this (was this) a risk only in high-rise buildings or plumbing systems in small homes can harbor *Legionella pneumophila* too?

A. During August of 2015 we focused our Legionella testing on residences and smaller buildings like McDonald's throughout the city. Despite looking as hard as we could, we could find no trace of the Legionella bacterial strain that causes disease. So in homes and small buildings at least, based on our data, the risk of exposure was relatively low. We published those data on our website earlier (http://flintwaterstudy.org/2015/09/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens-2/) in the year, and frankly, we were a little surprised there was not more Legionella.

However, just before the switch back to Detroit, we sampled larger buildings, and we found very high levels of the types of Legionella that cause disease. So we tend to feel, that the risk of exposure, was much higher in the bigger buildings.

3. The water has been "bleachy" in the last few days. Is that a risk?

A. This is actually a good sign that your risk of Legionella very low. The "bleach" or chlorine actually kills Legionella bateria.

Acknowledgements: Dr. Amy Pruden, Dr. Marc Edwards, Siddhartha Roy

1 Comment (http://flintwaterstudy.org/2016/01/initial-frequently-asked-questions-faq-regarding-legionella-bacteria-in-present-day-flint/#comments)

Results from Field Sampling in Flint (Aug 17-19 2015) : Opportunistic Pathogens #2 (http://flintwaterstudy.org/2015/09/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens-2/)

September 9, 2015 (http://flintwaterstudy.org/2015/09/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens-2/) Articles (http://flintwaterstudy.org/category/articles/), Research Updates (http://flintwaterstudy.org/category/research-updates/) biofilms (http://flintwaterstudy.org/tag/biofilms/), flint water (http://flintwaterstudy.org/tag/flint-water/), legionella (http://flintwaterstudy.org/tag/legionella/), legionnaire's disease (http://flintwaterstudy.org/tag/legionnaires-disease/), opportunistic pathogens (http://flintwaterstudy.org/tag/opportunistic-pathogens/), qpcr (http://flintwaterstudy.org/tag/qpcr/)

Report 5. *Additional Testing for Opportunistic Pathogens*

During our recent sampling trip to Flint on August 17-19 (http://flintwaterstudy.org/2015/09/our-flint-sampling-trip-aug-17-19-2015/), we collected samples to analyze for the presence of Opportunistic Pathogens (OPs) (http://flintwaterstudy.org/2015/08/opportunistic-pathogens/). We reported previously that we did not find evidence to indicate that the OPs (http://flintwaterstudy.org/2015/08/results-from-

field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens/) *Legionella pneumophila*, which may cause Legionnaire's Disease, or *Mycobacterium avium*, were present in any of the samples we collected.

During our trip, we collected samples (http://flintwaterstudy.org/2015/09/our-flint-sampling-trip-aug-17-19-2015/) from nine businesses located throughout the city of Flint, including eight of Flint's designated monitoring sites and a business located in close proximity to the drinking water treatment plant, and seven homes of Flint water consumers. For comparison, we also collected water from four businesses that receive water from Detroit. At each of these sites, we collected both water samples and swabs of bacteria growing on the surface within the faucet, known as the biofilm (http://www.colgateprofessional.com/patient-education/articles/what-is-biofilm).

Here we report on our results for several additional OPs, alongside the previous results, based on presence of DNA markers specific to each bacterium. Pathogenic species are indicated in red. *Mycobacterium* spp. represents a genus of bacteria that includes several pathogenic and non-pathogenic species. *Vermamoeba vermiformis* is of interest because it is an amoeba that may play an important role in the life cycle of some pathogens, such as *Legionella pneumophila*. In addition, we attempted to culture pathogenic *Staphylococcus* species from the samples.

Results:

		Acanthamoeba polyphaga	*Vermamoeba vermiformis*	*Pseudomonas aeruginosa*	*Mycobacterium spp.*	*Mycobacterium avium*	*Legionella spp.*	*Legionella pneumophila*
Flint Businesses Positive* (n=9)	Water	0	2	0	4	0	2	0
	Biofilm	1	2	0	5	0	1	0
Flint Homes Positive* (n=7)	Water	0	4	0	5	0	5	0
	Biofilm	2	2	0	3	0	1	0
Detroit Water Businesses Positive* (n=4)	Water	0	0	0	2	0	0	0
	Biofilm	0	2	1	3	0	0	0

*Positives are defined as samples from which quantities were greater than our lowest standard which amplified in triplicate: 10 copies / mL in water and 10,000 total copies per biofilm swab for all targets except *A. polyphaga* and *P. aeruginosa* which are 100 copies / mL in water and 100,000 total copies per biofilm swab.

(http://i2.wp.com/flintwaterstudy.org/wp-content/uploads/2015/09/tab.png)

Table 1: Frequency of detection of several Opportunistic Pathogens (shown in red) and additional microbes of interest that are not necessarily pathogenic (shown in black)

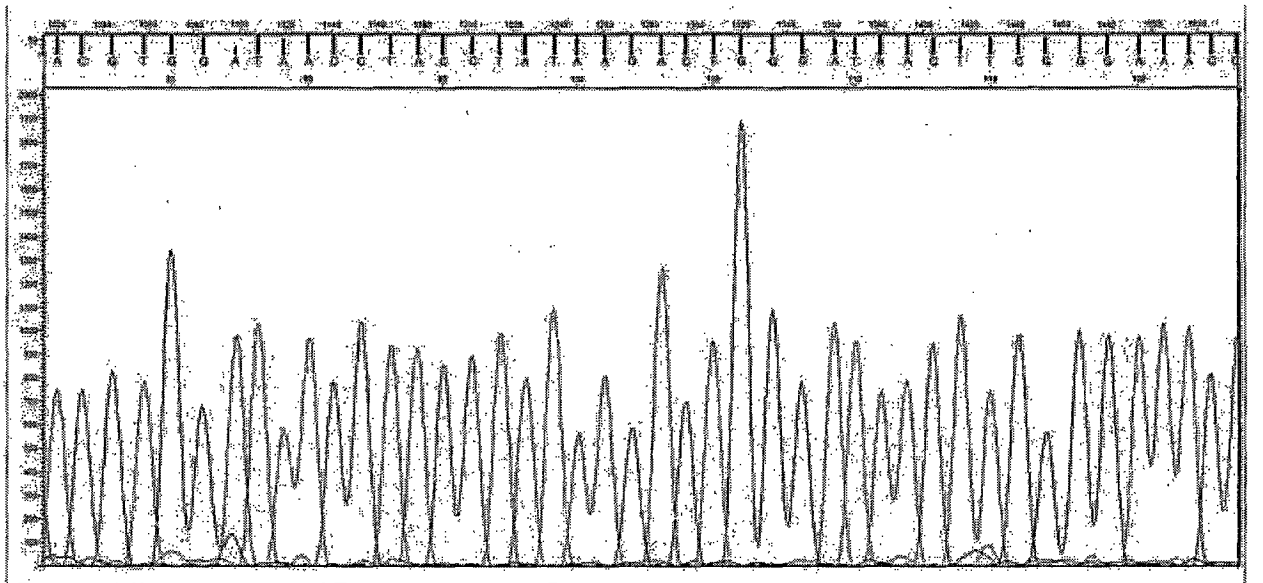
Table 1 demonstrates that we did not detect quantifiable levels of *Pseudomonas aeruginosa, Legionella pneumophila, or Mycobacterium avium* in water or biofilm samples collected from any of the sixteen sites in Flint. *Acanthamoeba polyphaga* was found in the biofilm at 3 sites in Flint. *Acanthamoeba polyphaga* is an amoeba that is often associated with eye infections of individuals using tap water for contact lens care rather than sterile saline, but has also been associated with skin and respiratory infections. More information on this amoeba can be found here (http://www.cdc.gov/parasites/acanthamoeba/).

Water from each site was also cultured using methods specific to growing *Staphylococcus*. Only two sites resulted in *Staphylococcus* growth. DNA from 10% of the resulting colonies were sequenced to identify the species. All sequences were identified to belong to either *Staphylococcus epidermidis* or *Staphylococcus hominis*. Both species are frequently found on the skin of healthy individuals and are not typically pathogenic.



(http://i2.wp.com/flintwaterstudy.org/wp-content/uploads/2015/09/culturing.jpg)

Figure 1: Culturing Staphylococcus spp. revealed species of the bacterium that are not typically pathogenic



(http://i2.wp.com/flintwaterstudy.org/wp-content/uploads/2015/09/sanger.png)

Figure 2: A method known as Sanger Sequencing was used to identify species of Staphylococcus based on unique patterns in the bacterium's DNA. An example of the sequencing output is shown here. Each colored peak represents a fluorescent signal and corresponds to a different letter in the DNA sequence, which can be seen at the top of the display.

Conclusion:

Although the number of samples collected has been small and were collected from each site on a single date, our results do not indicate the presence of pathogenic OPs in Flint water, with the exception of sporadic detection of *Acanthamoeba polyphaga* in biofilm samples. Overall, this limited sampling, indicates that **from a microbiological perspective Flint water does not seem to pose a health risk worse than many other U.S. cities that we have sampled.** However, the chronically low chlorine residuals throughout the distribution system, suggest that this issue should be the subject of continued scrutiny.

Additional Notes: The method we used to quantify the pathogens is called quantitative polymerase chain reaction (qPCR). It works by detecting DNA specific to the target microorganisms, making the method very specific, but also very sensitive, as an organism does not necessarily

need to be alive or culturable for us to identify that it is present. The minimum threshold of target bacteria, or more accurately the bacteria's DNA that must be present in the 1-liter samples that we collected is 10 DNA copies per mL or 10^4 copies in the entire swabbed biofilm. This is the best available and most sensitive method of OPs detection.

Analysis and write-up: Emily Garner

Acknowledgements: Dr. Marc Edwards and Dr. Amy Pruden

2 Comments (http://flintwaterstudy.org/2015/09/results-from-field-sampling-in-flint-aug-17-19-2015-opportunistic-pathogens-2/#comments)

Opportunistic Pathogens (OPs): #1 cause of waterborne diseases in the United States (http://flintwaterstudy.org/2015/08/opportunistic-pathogens/)

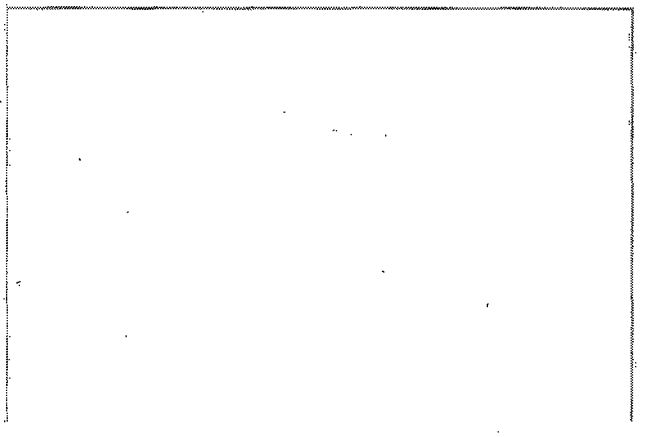
August 23, 2015 (http://flintwaterstudy.org/2015/08/opportunistic-pathogens/) Articles (http://flintwaterstudy.org/category/articles/) drinking water (http://flintwaterstudy.org/tag/drinking-water/), flint water (http://flintwaterstudy.org/tag/flint-water/), legionella (http://flintwaterstudy.org/tag/legionella/), opportunistic pathogens (http://flintwaterstudy.org/tag/opportunistic-pathogens/), skin rashes (http://flintwaterstudy.org/tag/skin-rashes/)

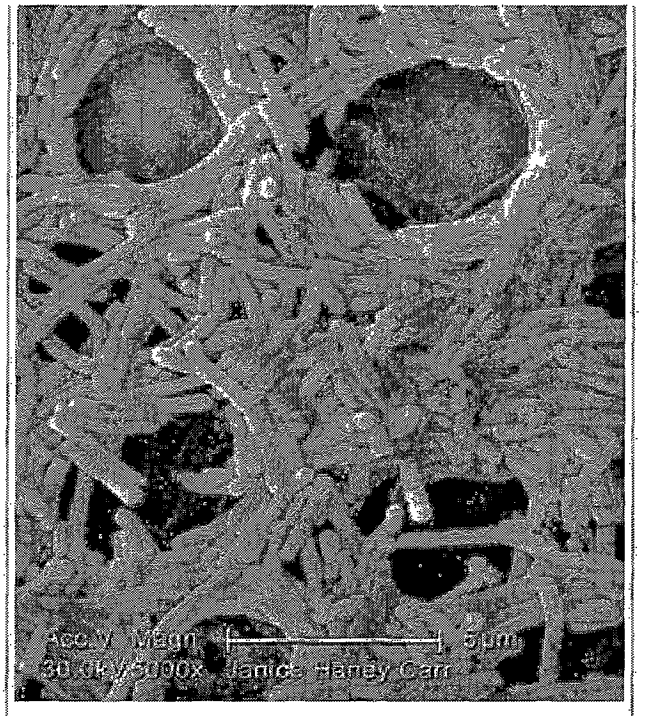
We have long known about the dangers associated with waterborne pathogens. Fecal contamination of drinking water sources can lead to gastrointestinal illness and deaths caused by a variety of waterborne pathogens. We control for these risks by 1) selecting clean water sources for treatment, 2) treating the water to remove particles and bacteria by filters, and 3) disinfecting water with chlorine. Treatment plants have to prove they are meeting very high standards in protecting the public from this danger, by frequently measuring filter efficiency and chlorine levels at

the treatment plant. In addition, utilities also have to double-check their control of this threat, by sampling their water pipelines for indicator bacteria which are present at very high concentrations in feces, such as coliforms and *E. coli*, and also maintaining significant levels of chlorine as water is transported to homes.

In recent decades, we have also come to recognize that fecal contamination is not the only source of waterborne pathogens in our drinking water. These other bacteria do not come from fecal contamination, but rather they grow in pipes and homes themselves, and are commonly referred to as Opportunistic Pathogens, or OPs for short. The presence of OPs in drinking water is a danger that is not directly addressed by existing Federal Regulations, despite the fact that an OP, *Legionella pneumophila* is now known to be the most frequently reported causative agent of waterborne disease outbreaks (http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5709a4.htm) (and deaths) in the United States.

The impacts that OPs can have on human health are numerous, and they generally do not come from drinking the water. For example, *Legionella pneumophila* (the bacterium which causes Legionnaire's disease) and *Mycobacterium avium* live in pipes, and human exposure occurs when consumers breath tiny water droplets in the air from showers or washing hands. *Staphylococcus aureus* can lead to skin infections when it contacts open cuts or existing irritations. *Pseudomonas aeruginosa* can lead to a variety of infections: lung and blood stream infections, skin irritations, and infections of the eye or ear.





Legionella bacteria (Image courtesy: CDC (http://www.cdc.gov/legionella/index.html))

Most OPs are not regulated or routinely measured in drinking water. Legionella is only regulated in water as it leaves the treatment plant, which is the location that is least likely to have high levels of Legionella, and the regulation does not do enough for public health protection. However, the conditions which are associated with a typical building's plumbing, can create ideal conditions for these bacteria to take hold, such as warm water, so Legionella can be present at very high levels in homes even when it is not detected at the treatment plant.

Residents of Flint have also reported many symptoms (see, here (http://www.theatlantic.com/business/archive/2015/07/dont-drink-the-water/399803/), here (http://www.freep.com/story/news/local/michigan/2015/01/14/flint-water-residentcomplaints/21743465/) and here (http://www.freep.com/story/news/local/michigan/2015/01/22/water-woes-latest-hit-flint/22193291/)) which are consistent with those associated with some infections caused by waterborne OPs, such as skin irritations. However, it is unclear whether OPs may be contributing to this

problem due to a lack of water testing, and difficulties in linking human health problems to water exposure. There is some indication that in March 2015, the Health Department was exploring possible links (http://flintwaterstudy.org/wp-content/uploads/2015/08/timeline-of-events-final-06-24-2015.pdf)between drinking water and cases of Legionnaire's disease in Genesse County.

Additional water testing targeting OPs, particularly of samples collected at the point of use within homes, could offer valuable information regarding the microbial water quality of the drinking water available to residents of Flint.

Primary Author: Emily Garner

Acknowledgements: Dr. Marc Edwards, Dr. Brandi Clark and William Rhoads

2 Comments (http://flintwaterstudy.org/2015/08/opportunistic-pathogens/#comments)

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We thank the **68** generous contributors who helped raise **$4,345** through our **SafeWater4Flint** fundraising campaign.The funds have been donated to the United

Way of Genesee County (http://www.unitedwaygenesee.org/civicrm/contribute/transact?reset=1&id=5) who are spearheading filter distribution in Flint. You can donate directly to United Way on their donation page here (http://www.unitedwaygenesee.org/civicrm/contribute/transact?reset=1&id=5).

INFORMING FLINT RESIDENTS ABOUT LEAD IN THEIR WATER

All Flint residents who returned their lead kits will receive their results via regular mail. You will also receive this document on how to interpret your lead results (http://flintwaterstudy.org/wp-content/uploads/2015/08/interpretation.pdf). For the 277 lead kits analyzed so far, we have finished calling residents who had considerably high lead in their water.

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Shekter Smith, Liane (DEQ)

From: Wyant, Dan (DEQ)
Sent: Thursday, October 15, 2015 1:27 PM
To: Krisztian, George (DEQ); Sygo, Jim (DEQ); Shekter Smith, Liane (DEQ)
Subject: Fwd: Urgent Request for Clarification: Letter to Lee-Anne Walters and justification for invalidating her samples.

Sent from my iPhone

Begin forwarded message:

> **From:** Marc Edwards <edwardsm@vt.edu>
> **Date:** October 15, 2015 at 10:44:08 AM EDT
> **To:** <WyantD@michigan.gov>, <lwalters313@gmail.com>, Andrew Leavitt <ALeavitt@senate.michigan.gov>, Melissa Mays <indigrace@gmail.com>, "Dickinson, Jordan" <Jordan.Dickinson@mail.house.gov>
> **Subject: Urgent Request for Clarification: Letter to Lee-Anne Walters and justification for invalidating her samples.**
>
> Hi Dan,
>
> Thank you for your help (if any) with the MDEQ FOIA. I received the documents last night. I was hoping you could help me with something ASAP.
>
> One of the things creating distrust between Flint residents and MDEQ, is a long list of miscommunications and false statements by your employees. I want you to help us understand one of those miscommunications as soon as possible.
>
> On August 4th your employee's Wurfel, Busch and Shekter Smith met with Melissa and Lee-Anne. According to Melissa and Lee-Anne, in a meeting with the governor's Chief of Staff, your employee's could not explain to them, why Lee-Anne's samples were invalidated (i.e., thrown out of the samples used to calculate the 90%'ile lead).
>
> For your information, on the basis of records from the City, **Lee-Anne's home is the ONLY home in the 2015 sampling pool that is proven to have a lead pipe.** I have compared the sample sites that the city used to the database that Flint has put together, **and of 11 samples in the database that the city claims had a lead pipe, ZERO actually had a lead pipe.** Michigan and Federal law further states that if a sample is taken from a home with a lead pipe, **even if it has a point of use device like a filter or softener,** once that sample is collected it cannot be invalidated (see below). EPA R5 staff explicitly told your employee's in writing, that Lee-Anne's samples had to be counted for compliance purposes. **Your employee's nonetheless, over R5's written instructions and the law, threw out the only Flint LCR samples known to be legitimate in the 2015 sampling round.** They also double counted Melissa's samples for LCR compliance purposes, even though her house does not have a lead pipe, and has no lead plumbing. So I hope you can see the "adding insult to injury" dimension of your employee's actions. The irony-- using samples from the chief critics of MDEQ, to cheat on the LCR monitoring. Specifically, counting a lead free site twice (when it should not be counted at all), and throwing out three samples from the only home known to have lead pipe. We also now have data that shows every single sample we could check in the 2015 round, did not have a lead pipe at all.

Furthermore, according to Melissa and Lee-Anne, the Governors chief of staff ordered your employee's, to as soon as possible, communicate to Lee-Anne why her samples were invalidated. According to Melissa and Lee-Anne, the governor's chief of staff further ordered your employees to "CC" him on that communication. The governor's chief of staff also apparently asked them to get Lee-Anne's address and phone number, so that they could be sure their communication got to her, and they refused, and insisted they had all of Leigh-Anne's information.

In the FOIA production, I was surprised to see that there is an e-mail to Lee-Anne dated August 25th. This is surprising because Lee-Anne never received that e-mail. Moreover, there is an apology to Lee-Anne that the e-mail is late, and furthermore, the chief of staff is not cc'd. Lee-Anne has looked in her spam and other files, and there is no evidence that this late e-mail ever reached her.

I am hoping you can get to the bottom of this, and see first of all 1) why the chief of staff was not cc'd as requested, 2) if this e-mail was actually sent, and produce some evidence that it was, and 3) try to understand why your employee's illegally invalidated Lee-Anne's samples over the objections of EPA and Lee-Anne. And I am hoping you can do this today. My understanding is that you are out and about trying to re-establish public trust in MDEQ, and this would be a good place to start.

Best Regards,

Marc Edwards

From your own web page.
c. Softeners and Other Point of Use (POU) and Point of Entry (POE) Devices:
Sampling sites with faucets that have POU or POE treatment devices, such as softeners, shall not be used as Tier 1, 2, or 3 sites unless insufficient Tiered sites are available. Field staff shall encourage water supplies to sample from a kitchen or bathroom tap that is not normally connected to the softener. **If a sample of softened water is analyzed, then the water supply may consider returning to the same site to collect a sample of unsoftened water. Some residents may be able to bypass the softener at the tap. Both sample results (softened and unsoftened) will be used to calculate the 90th percentile. Sample results shall not be deemed improper on the basis that the water passed through a softener.**

Shekter Smith, Liane (DEQ)

From: Sygo, Jim (DEQ)
Sent: Tuesday, December 08, 2015 8:37 AM
To: Shekter Smith, Liane (DEQ)
Subject: FW: Request for Email log Case: 1512-1099

FYI You may want to hang on to this.

From: Shaler, Karen (DEQ)
Sent: Tuesday, December 08, 2015 8:32 AM
To: Wyant, Dan (DEQ); Sygo, Jim (DEQ); Wurfel, Brad (DEQ); Shekter Smith, Liane (DEQ); Davis, Donna (DNR); McDonald, Paul (DEQ); Beaulac, Michael (DEQ); Sporer, Bonita (DEQ); Eyer, Tamara (DEQ); Price, Lisa (MCSC); Thelen, Mary Beth (DEQ); Devereaux, Tracy Jo (DEQ); Slater, Donna (DNR)
Cc: Merricle, Jennifer (DTMB); Rosales, Manny (DTMB)
Subject: FW: Request for Email log Case: 1512-1099

DTMB OA/Messaging was able to determine that Liane's August 25 e-mail to Lee-Anne Walters was successfully delivered (see yellow highlighted text, below).

From: Glomski, Tom (DTMB)
Sent: Tuesday, December 08, 2015 7:53 AM
To: Shaler, Karen (DEQ)
Cc: Vega, Dave (DTMB); Lee, Timothy (DTMB)
Subject: Request for Email log Case: 1512-1099

From OA/Messaging:

Tom, Part I proves that the email was successfully delivered to the gmail.com system while Part II shows the subject line.

Part I
==========
---------- MAILTRACE.LOG.20150825.0001

---------- MAILTRACE.LOG.20150825.0002
2015/08/25 13:47:15 GMT-04:00 890001e60001b242@Michigan.gov 0 0 SHEKTERL@michigan.gov Mike.OMalley@STServices.com;MCOLEMAN@WadeTrim.com;bballard@mi-water.org;spitzleyh2o@hotmail.com;ccirving@ftch.com Message<890001e60001b242@Michigan.gov> accepted from [10.42.92.167] to [<Mike.OMalley@STServices.com>;<MCOLEMAN@WadeTrim.com>;<bballard@mi-water.org>;<spitzleyh2o@hotmail.com>;<ccirving@ftch.com>;].
2015/08/25 13:47:17 GMT-04:00 890001e60001b242@Michigan.gov 1 256 SHEKTERL@michigan.gov ccirving@ftch.com Message<890001e60001b242@Michigan.gov> relayed through host[65.23.72.90] to [ccirving@ftch.com] successfully. 9FD841F4-EA17-4718-8CC1-8DD65CE8492B
2015/08/25 13:47:18 GMT-04:00 890001e60001b242@Michigan.gov 1 256 SHEKTERL@michigan.gov spitzleyh2o@hotmail.com Message<890001e60001b242@Michigan.gov> relayed through host[134.170.2.199] to [spitzleyh2o@hotmail.com] successfully. 9FD841F4-EA17-4718-8CC1-8DD65CE8492B

2015/08/25 13:47:20 GMT-04:00 890001e60001b242@Michigan.gov 1 256
SHEKTERL@michigan.gov bballard@mi-water.org Message<890001e60001b242@Michigan.gov> relayed through host[207.46.163.247] to [bballard@mi-water.org] successfully. 9FD841F4-EA17-4718-8CC1-8DD65CE8492B
2015/08/25 13:47:21 GMT-04:00 890001e60001b242@Michigan.gov 1 256
SHEKTERL@michigan.gov MCOLEMAN@WadeTrim.com Message<890001e60001b242@Michigan.gov> relayed through host[64.141.138.228] to [MCOLEMAN@WadeTrim.com] successfully. 9FD841F4-EA17-4718-8CC1-8DD65CE8492B
2015/08/25 13:47:23 GMT-04:00 890001e60001b242@Michigan.gov 1 256
SHEKTERL@michigan.gov Mike.OMalley@STServices.com Message<890001e60001b242@Michigan.gov> relayed through host[207.46.163.215] to [Mike.OMalley@STServices.com] successfully. 9FD841F4-EA17-4718-8CC1-8DD65CE8492B
2015/08/25 13:55:57 GMT-04:00 8907f79e0001b51a@Michigan.gov 0 0
SHEKTERL@michigan.gov lwalters313@gmail.com Message<8907f79e0001b51a@Michigan.gov> accepted from [10.42.214.199] to [<lwalters313@gmail.com>;].
2015/08/25 13:55:58 GMT-04:00 8907f79e0001b51a@Michigan.gov 1 256
SHEKTERL@michigan.gov lwalters313@gmail.com Message<8907f79e0001b51a@Michigan.gov> relayed through host[74.125.201.27] to [lwalters313@gmail.com] successfully. E20141EC-E8F6-422D-BD9C-FFAB654CB868

---------- MAILTRACE.LOG.20150825.0003
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Part II
==========

---------- POLEVT.IMSS.20150825.0001
2015/08/25 13:47:15 GMT-04:00 917D1BD4-3EE1-4CA1-A36B-A0B9DAF57F90 SHEKTERL@michigan.gov
Mike.OMalley@STServices.com;MCOLEMAN@WadeTrim.com;bballard@mi-water.org;spitzleyh2o@hotmail.com;ccirving@ftch.com Follow up from July Board meeting 2
0000000000000 13.740234 00100000000000 0.000000 1 0
0 0 0 0 <890001e60001b242@Michigan.gov> 0 0
0 0
2015/08/25 13:55:57 GMT-04:00 0645B8D1-FB70-4E02-A6B2-E33F14F9D261 SHEKTERL@michigan.gov
lwalters313@gmail.com Follow Up from our Aug. 4th meeting 2 0000000000000
28.126953 00100000000000 0.000000 1 0 0
0 0 0 <8907f79e0001b51a@Michigan.gov> 0 0 0
0

---------- POLEVT.IMSS.20150825.0002

Thomas Glomski
Security Analyst
Michigan Security Operations Center (MiSOC)
DTMB, Michigan Cyber Security
Desk Phone (517) 241-7067
MiSOC Central number (517) 335-1722

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Shekter Smith, Liane (DEQ)

From: Dykema, Linda D. (DCH)
Sent: Thursday, July 23, 2015 10:08 AM
To: Busch, Stephen (DEQ); Philip, Kris (DEQ); Shekter Smith, Liane (DEQ)
Subject: FW: Director's Office Assignment -- Flint - need update asap

FYI - this is what I sent up to my front office. Thanks for your help Steve.

-----Original Message-----
From: Dykema, Linda D. (DCH)
Sent: Thursday, July 23, 2015 10:07 AM
To: Miller, Corinne (DCH); Peeler, Nancy (DCH); Anderson, Paula (DCH); Travis, Rashmi (DCH); Grijalva, Nancy (DCH); Moran, Susan (DCH)
Cc: Priem, Wesley F. (DCH); Bouters, Janese (DCH); Barr, Jacqui (DCH); Fink, Brenda (DCH); Groetsch, Kory J. (DCH)
Subject: RE: Director's Office Assignment -- Flint - need update asap

I spoke with Steve Busch, Lansing District Office manager, DEQ Office of Drinking Water & Municipal Assistance.

The city of Flint recently conducted drinking water testing throughout the city with special attention to those areas known to have old service lines. The city water supply is in compliance with the lead rule, which means that 90% of the water samples were less than the lead action level of 15 ppb. DEQ will, however, recommend that Flint further "optimize" their corrosion control methods. The DEQ has not seen a change in the city's compliance with the lead rule since switching to the Flint River source.

Some water samples had lead levels above 15 ppb. Homeowners receive their sampling results and those with elevated levels are provided with information regarding how to minimize their exposure, including replacement of water supply lines. The city pays for line replacement from the main to the property boundary. The property owner is responsible for some portion of the cost if the line replaced is on their property. To Steve's knowledge, there is no program in Flint to assist homeowners with limited financial means.

Regarding the home with high drinking water lead levels: some years ago the supply line that serves the neighborhood was replaced, but somehow this house was not connected to the new line, such that the family's drinking water supply was coming from the old corroded lead pipe. None of the neighbors water had elevated lead levels, which was likely why she was temporarily connected by garden hose to a tap supplied by the new line. She has since been permanently connected to the new line.

Regarding the EPA drinking water official quoted in the press articles: the report that he issued was a result of his own research and was not reviewed or approved by EPA management. He has essentially acted outside his authority.

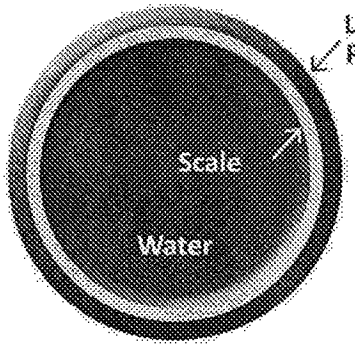
Genesee County Health Department

Frequently Asked Questions About
Adding Phosphate to Flint Water

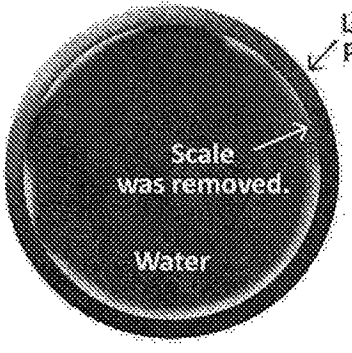
MDHHS Michigan Department of Health & Human Services

Why is phosphate being added to our water?

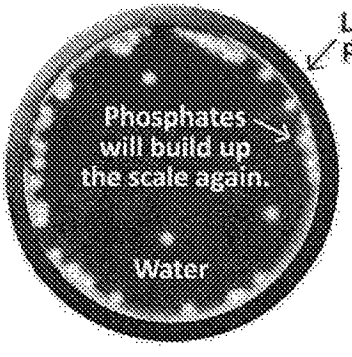
- Homes built before 1986 are more likely to have lead service lines and pipes. Brass faucets and certain kinds of solder could also have lead in them.
- The lead found in tap water in the City of Flint is from these older pipes, solder, and faucets.



- Over the years, minerals in our water have built up on our water pipes. This kept the water from actually touching the pipes.
- This mineral build-up is called scale.
- This scale helped to keep a lot of lead from the pipes out of our water.



- The chemicals added to the Flint River water to make it drinkable also removed some of the scale.
- Less scale means that the water can touch the pipes again. If there is lead in the pipes, it can get into water.



- This is why some houses with older pipes or service lines have lead in the water.
- Adding extra phosphate to the water will let the scale build back up on the pipes faster than just waiting for it to happen again naturally.

Learn About Phosphate

- Phosphorus is a natural mineral that your body needs. It works with calcium to keep your bones strong and healthy.
- Phosphate is a type of salt that has phosphorus in it.
- Extra phosphate is being added to the water in the City of Flint to help put the scale back on the pipes.
- The City of Flint, MDEQ, and the EPA worked together to find how much phosphate is needed to help quickly coat the pipes with scale.
- The levels of phosphate in your drinking water should be safe for everyone.
- Continue to use water filters that remove lead until the scale is built back up and the Genesee County Health Department's Public Health Emergency Declaration is removed.

If you have questions about the phosphate being added to City of Flint water, please call the Flint Water Department at 810-787-6537.
If you have questions about phosphates and your health, please call MDHHS at 1-800-648-6942.

Muchmore, Dennis (GOV)

From:	Muchmore, Dennis (GOV)
Sent:	Monday, August 3, 2015 5:38 PM
To:	Muchmore, Dennis (GOV)
Subject:	FW: Updated Memo on Water Coalition Questions - July 29
Attachments:	Flint Testing and EBLLs_2.xlsx

For meeting with Pastors and community leaders.

From: Lyon, Nick (DCH)
Sent: Friday, July 31, 2015 10:57 AM
To: Muchmore, Dennis (GOV);
Subject: Re: Updated Memo on Water Coalition Questions - July 29

Our Public Health staff followed up a bit more on the lead question. Below is their email update to me.

From: Grijalva, Nancy (DCH)
Sent: Wednesday, July 29, 2015 11:23 AM
To: Lyon, Nick (DCH)
Subject: FW: Director's Office Assignment -- Flint - need update asap
FYI.....
-----Original Message-----
From: Peeler, Nancy (DCH)
Sent: Tuesday, July 28, 2015 2:57 PM
To: Anderson, Paula (DCH); Miller, Corinne (DCH); Travis, Rashmi (DCH); Moran, Susan (DCH); Grijalva, Nancy (DCH); Fink, Brenda (DCH)
Cc: Priem, Wesley F. (DCH); Dykema, Linda D. (DCH); Bouters, Janese (DCH); Barr, Jacqui (DCH)

Subject: RE: Director's Office Assignment -- Flint - need update asap

I apologize for the delay in responding more specifically to this assignment, it took some time to review our Childhood Lead Poisoning Prevention program data to see if it might contribute to the understanding of the situation in Flint with their water supply. Here is what we found:

We looked at lead testing results for May 2014-April 2015, which is the 12 month time frame just after Flint started drawing their water from the river (water source changed in April 2014).

We compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts--

- Lead testing rates remained about the same from year to year (chart on the right).
- There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).
- However that pattern was not terribly different from what we saw in the previous three years, especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).
- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more

often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspect that the summer data spike may be related to this effect.

- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015.

So upon review, we don't believe our data demonstrates an increase in lead poisoning rates that might be attributable to the change in water source for Flint. We recognize that lead exposure via the water is only a small piece of what may be happening for families in Flint, however, we hope the information is helpful.

Nancy Peeler

Michigan Department of Health and Human Services
Protocol for Collecting Residential Drinking Water Samples for Lead Analysis
November 19, 2015
Revised December 7, 2015

The following protocol will be used by the Michigan Department of Health and Human Services (MDHHS) to ensure that residential drinking water samples are collected in a systematic, consistent manner as part of an elevated blood lead (EBL) investigation. The results will be used to evaluate human exposure to lead in household drinking water and to identify all plumbing components from the home to the water main that are contributing lead to household drinking water.

MDHHS will:

- Collect water samples from the kitchen faucet used for drinking and cooking; a secondary faucet, most likely a bathroom sink; and any additional faucets based on frequency of use for consumptive purposes.
- Collect two small volume [125 milliliter (mL)] first-draw samples from selected cold faucet to evaluate exposure to lead in drinking water.
- Collect ten large volume [1 liter (L)] sequential samples from the kitchen cold faucet to identify plumbing components that are contributing lead to the household water supply.
- Incorporate the results of water testing into the EBL investigation report.

Before the EBL Inspection

Obtain information about the age of the house and any building additions. Identify if there are any records of previous water testing in the past two years. If possible, obtain information about the materials used in the water service line (lead, galvanized, copper or plastic) and if any street work was done in the front of the house (this includes road work, water main work, or other utility work). Document with photos, if possible, otherwise make a notation.

Instruct residents not use any water in the house for any purpose (including toilet flushing) for at least 6 hours prior to sample collection.

Step 1 – Prior to Sample Collection

Sampling staff should confirm upon arrival at the home that no water has been used in the home for at least 6 hours prior to sample collection.

Step 2 – Identify and Label the Sample Faucets

- Identify the primary cold kitchen faucet.
- Identify a secondary cold faucet based on use: most likely a bathroom sink.
- Identify any additional cold faucets that are frequently used.

Identify each sampling location on the interior floor plan. Document each sampling location with digital photos, including the connections beneath the sink. Note the presence of any potential brass components or treatment devices, and whether the faucet has an aerator. Document other noteworthy items for each location such as leaky faucet, rust stained sink, etc. Document any exposed plumbing in the basement, if possible.

If a temporary in-line filter is installed on the faucet, use the by-pass lever to collect unfiltered water samples. A whole house filter does not preclude sampling, as this is a permanent filter and representative of actual exposure.

Each water sample must be given a unique identification (ID) code that identifies the location of the faucet, the sample volume, and the order of sample collection.

Faucet location is indicated as follows:

- KF = kitchen faucet, cold
- BF = bathroom faucet, cold
- OF = other faucet, cold (specify type)

The two 125-mL first draw samples are labeled in order of collection P1 and P2. For example, the ID codes for the bathroom faucet samples would be BF-P1 and BF-P2.

The 10 large volume 1-L sequential samples collected from the kitchen faucet are labeled A1 through A10. For example, the first sequential sample at the kitchen faucet is labeled KF-A1, the second is labeled KF-A2 ... through KF-A10.

Step 3 – Collect the Small Volume Samples from the Kitchen Faucet

Before sample collection:

1. Write the assigned ID code on each sample bottle's green label using a black Ultra Fine Point Sharpie permanent marker. To ensure clarity for the DEQ lab, draw a slash mark through each zero, the number one is a straight vertical line (no hat or foot), and cross each number seven.

2. Next, remove the cap from each bottle and label using a red Fine Point Sharpie permanent marker. Write '1' on the white cap of the bottle marked as P1; write '2' on the cap of the bottle marked as P2. Caps must be placed open side up to avoid contamination when not on the bottle.

3. Complete the *Request for Analysis* forms for each sample using a pen, pencil or black Sharpie. If the Lead and Copper analyses is not already selected, mark as 32CC for the 125-mL samples.

~~Collect 125-mL samples from all secondary faucets before collecting any samples from the primary kitchen faucet.~~ Collect the P1 sample as the very first-draw from ~~each~~ the kitchen cold water faucet, followed by the P2 sample.

DO NOT REMOVE THE AERATOR IF THERE IS ONE, but make a notation that there is an aerator present.

Sample collection:

1. Place the P1 bottle under the faucet, open the faucet to produce a moderate, steady stream and fill the first bottle to the appropriate level. Immediately fill the P2 bottle without a break in the stream (do not turn off the faucet between the first and second bottle and do not allow water to run down the drain in between the first and second bottle if at all possible).
2. Turn off faucet. Cap each sample bottle making sure to match the P1 sample to the '1' white cap, and the P2 sample to the '2' white cap.
3. Secure the appropriate request for water analysis form to each bottle (refer to the example bottle provided for "instructions") with a rubber band.
4. Bundle the P1 and P2 samples collected at ~~each~~ the kitchen cold water faucet (after the proper paperwork has been banded to each bottle) and secure them together with a single rubber band.

Step 4 – Collect the Large Volume Samples

After ~~all~~ the 125-mL samples have been collected from the kitchen cold water faucet; collect ten sequential 1-L samples in wide-mouth bottles from the kitchen cold water faucet. In some cases, more than ten sequential 1-L samples will need to be collected. Estimate the distance from the front of the house to the water main. Divide that distance by 15 and round up to the nearest whole number. Add four to the result to account for internal plumbing. For example, if the front of the house is about 150 feet from the water main, divide 150 by 15 (150/15 = 10). Add four to the resulting number (10+4 = 14) and collect 14 samples.

Before sample collection:

1. Write the assigned ID code on each sample bottle's green label using a black Ultra Fine Point Sharpie permanent marker. To ensure clarity for the DEQ lab, draw a slash mark through each zero, the number one is a straight vertical line (no hat or foot), and cross each number seven.
2. Next, remove the cap from each bottle and label using a red Fine Point Sharpie permanent marker. Write 1 through 10 on the white caps of the 1-L bottles for the A1 through A10 sequential samples. Caps must be placed open side up to avoid contamination when not on the bottle.

3. Complete the Request for Analysis forms for each sample using a pen, pencil or black Sharpie. If the Lead and Copper analyses is not already selected, mark as 36CC for the 1-L samples.

Sample collection:

1. Place the A1 bottle under the faucet, open the kitchen cold water faucet gently but fully (to simulate a resident filling a glass or pot with water) ~~to produce a moderate, steady stream~~ and fill the first bottle to the appropriate level. Immediately fill bottles A2 to A10 consecutively without a break in the stream (do not turn off the faucet between bottles and do not allow water to run down the drain between the bottles).
2. After all 1-L samples are collected, turn off faucet. Cap each sample bottle making sure to match the A1 sample to the '1' white cap, the A2 sample to the '2' white cap and so forth.
3. Secure the appropriate request for water analysis form to each bottle (refer to the example bottle provided for "instructions") with a rubber band.

If aerator is present, remove and check for particles after all samples have been collected from the kitchen faucet. Photograph the aerator, if possible, and make a notation about presence or absence of particles.

Step 5 – Collect the Small Volume Samples from All Secondary Faucets

Before sample collection:

1. Write the assigned ID code on each sample bottle's green label using a black Ultra Fine Point Sharpie permanent marker. To ensure clarity for the DEQ lab, draw a slash mark through each zero, the number one is a straight vertical line (no hat or foot), and cross each number seven.
2. Next, remove the cap from each bottle and label using a red Fine Point Sharpie permanent marker. Write '1' on the white cap of the bottle marked as P1; write '2' on the cap of the bottle marked as P2. Caps must be placed open side up to avoid contamination when not on the bottle.
3. Complete the *Request for Analysis* forms for each sample using a pen, pencil or black Sharpie. If the Lead and Copper analyses is not already selected, mark as 32CC for the 125-mL samples.

Collect the P1 sample as the very first-draw from each faucet, followed by the P2 sample.

DO NOT REMOVE THE AERATOR IF THERE IS ONE, but make a notation that there is an aerator present.

Sample collection:

1. Place the P1 bottle under the faucet, open the faucet to produce a moderate, steady stream and fill the first bottle to the appropriate level. Immediately fill the P2 bottle without a break in the stream (do not turn off the faucet between the first and second bottle and do not allow water to run down the drain in between the first and second bottle if at all possible).
2. Turn off faucet. Cap each sample bottle making sure to match the P1 sample to the '1' white cap, and the P2 sample to the '2' white cap.
3. Secure the appropriate request for water analysis form to each bottle (refer to the example bottle provided for "instructions") with a rubber band.
4. Bundle the P1 and P2 samples collected at each faucet (after the proper paperwork has been banded to each bottle) and secure them together with a single rubber band.

If aerator is present, remove and check for particles after all samples have been collected from the secondary faucet. Photograph the aerator, if possible, and make a notation about presence or absence of particles.

Step ~~5~~ 6 - Deliver all sample bottles to the Michigan Department of Environmental Quality (MDEQ) Drinking Water Laboratory.

The attached map provides directions to the State Laboratory located at 3350 North M.L. King Blvd., Lansing, Michigan. Access is available Monday to Friday from 7am to 5pm, but after-hours deliveries may be pre-arranged by calling during business hours.

Contact Julia Pieper at 517-335-8076 or pieperj2@michigan.gov, or the Laboratory at 517-335-8184 to provide driver names and estimated time of arrival to the security team so that drivers can be cleared for entrance.

Drivers must present ID (driver's license) at the entrance security gate.

The DEQ Drinking Water Laboratory will analyze all water samples in accordance with the Laboratory Services Standard Operating Procedure (SOP) Document SOP #800 Revision #4 Effective Date 10/2015.

Applicable analytical methods will be in accordance with the *Method for Determination of Metals in Environmental Samples, Supplement I,* U.S. Environmental Protection Agency, Method 200.8, 1999 Revision 5.5.

All Method Detection Limits shall be performed according to Title 40 of the Code of Federal Regulations, Part 136, Guidelines Establishing Testing Procedures for the Analysis of Pollutants, Appendix B, Definition and Procedure for the Determination of the Method Detection Limit.

Analytical quality control will be in accordance with SOP #800 Revision #4.

WL Performance Products LP

PRODUCT DATA SHEET

PRODUCT: Phosphoric Acid, 75%

NSF

GRADE: Technical CODE: 750

GENERAL DESCRIPTION: Clear colorless liquid with no foreign odor

FORMULA: H_3PO_4 MOLECULAR WEIGHT: 98.0

CAS NO.: 7664-38-2 DATE EFFECTIVE: November 5, 2005

CHARACTERISTICS	SPECIFICATION LIMITS
Specific Gravity @ 25°/15.5°C	1.574 Minimum
Equivalent H_3PO_4, %	75.0 Minimum
Equivalent P_2O_5, %	54.3 Minimum
Color, APHA	20 Maximum

NOTE: Specification Limits are subject to change from time to time. Please contact us for current data sheet.

Plant Location: Carondelet (St. Louis), MO; Carteret, NJ; Lawrence, KS

Packaging: 3000 gal. tank truck; 14,000 gal. tank cars.
15 gal.(200 lb.) & 55 gal. (700 lb.) plastic drums (nonreturnable)

Labeling Requirements: Product Label and DOT CORROSIVE label required by law.

Shipping Classification:
1. Single package of 5000 lbs. or more:
Phosphoric Acid
CORROSIVE MATERIAL, UN 1805, RQ
STCC4930248
2. Single package of less than 5000 lbs.:
Phosphoric Acid
CORROSIVE MATERIAL, UN 1805
STCC4930248

10495 10495

Handling Precautions:
NOT FOR FOOD OR DRUG USE. CORROSIVE TO MILD STEEL. DANGER! CAUSES BURNS TO EYES AND SKIN. Avoid contact with eyes, skin, and clothing. Avoid breathing vapor or mist. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling.
FIRST AID: If in eyes or on skin, immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse.
IN CASE OF SPILL OR LEAK: Contain spill or leak to prevent discharge to environment. Emptied container retains vapor and product residue. Observe all labeled safeguards until container is cleaned, reconditioned or destroyed.

This Product Data Sheet is subject to the terms and conditions on the reverse side hereof.

PHOSPHORIC ACID , 75%; TECHNICAL GRADE

Key Properties:

- Phosphoric acid is relatively non-volatile and stable at elevated temperatures; it is a much milder acid than sulfuric, nitric, or hydrochloric acids.
- Heavy, viscous liquid, 13.1 to 13.2 lbs./gal.
- Remains liquid at very low temperatures: Freezing point, -18°C (0.5°F)
- Shelf-life •-• 24 months

Applications:

- Bonding agent for refractory materials
- Industrial and institutional cleaning and sanitizing products
- Liquid fertilizers
- Aluminum bright-dipping
- Metal treating and phosphatizing
- Flameproofing agent
- Catalyst in chemical processes
- Effluent treatment
- Animal feed supplement
- Potable Water Treatment: ICL Performance Products LP Phosphoric Acid, 75%, conforms to the requirements of ANSI / NSF Standard 60; used for corrosion and scale control. Maximum Use Level = 13 mg/L.

FOR MORE COMPLETE INFORMATION ON PROPERTIES AND SAFE HANDLING OF THIS MATERIAL, SEE THE ICL PERFORMANCE PRODUCTS LP MATERIAL SAFETY DATA SHEET (MSDS).

NOTICE: Although the information and recommendations set forth herein (hereinafter "Information") are presented in good faith and believed to be correct as of the date hereof, ICL Performance Products LP makes no representations or warranties as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will ICL Performance Products LP be responsible for damages of any nature whatsoever resulting from the use of or reliance upon Information or the product to which Information refers. Nothing contained herein is to be construed as a recommendation to use any product, process, equipment or formulation in conflict with any patent, and ICL Performance Products LP makes no representation or warranty, express or implied, that the use thereof will not infringe any patent. The data set forth herein are based on samples tested and are not guaranteed for all samples or applications. Such data are intended as guides and do not reflect product specifications for any particular product. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OR MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.

ICL PERFORMANCE PRODUCTS LP © November, 2005

Corporate Offices:

622 Emerson Road
Suite 500
St. Louis, Missouri 63141
314-983-7500

For order assistance, please call our Customer Service Department Toll Free: 1-800-244-6169

Genesee County Health Department

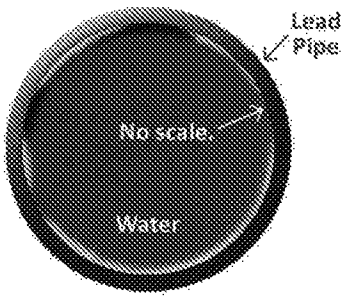
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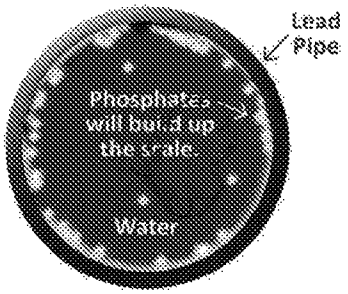
Adding Phosphate to Flint Water

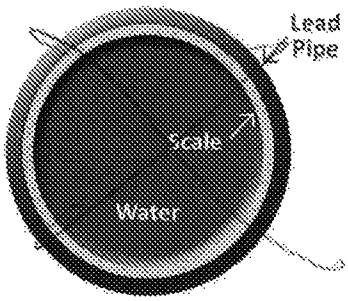
MDHHS Michigan Department of Health & Human Services

- Homes built before 1986 are more likely to have lead service lines and pipes. Brass faucets and certain kinds of solder could also have lead in them, even in those installed recently.
- The lead found in tap water in homes around Michigan is likely from these older pipes, solder, and faucets.
- New pipes and solder have to be lead free.
- Replacing old pipes and service lines is the only sure way to limit the lead in your tap water.

So, why is phosphate being added to our water?







- Use of lead pipes and solder used to be common. We now know that lead can harm our health.
- But, over the years, minerals in our water have built up inside our water pipes. This kept the water from actually touching the lead pipes.
- This mineral build-up is called scale.
- This scale helps to keep a lot of lead from the pipes out of our water.
- If something happens to the scale and the water can touch the pipes, lead can get into the water.
- Adding phosphate to the water will build and maintain scale inside the pipes faster than waiting for it to happen naturally.

Learn About Phosphate

- Phosphorus is a natural mineral that your body needs. It works with calcium to keep your bones strong and healthy.
- Phosphate is a type of salt that has phosphorus in it.
- Extra phosphate is being added to the water in the City of Flint to help put more scale in the pipes.
- The City of Flint, MDEQ, and the EPA worked together to find how much phosphate is needed to help quickly coat the pipes with scale.
- The levels of phosphate in your drinking water should be safe for everyone.
- We don't know how long it will take for the scale to build up.
- Continue to use water filters that remove lead until the Genesee County Health Department's Public Health Emergency Declaration is removed.

If you have questions about the phosphate being added to City of Flint water, please call the Flint Water Department at 810-787-6537.

If you have questions about phosphate and your health, please call MDHHS at 1-800-648-6942.

2/22/2016

~~U.K~~ 4 connection 125 ml

→ kitchen

bath

10 connection 1 L @ kitchen.

take samples first thing in the morning before using water.

plus 2 small bottles for an on-site decision to sample another top.

Flow/coordination of EBL cases

- MDHHS (Bob Scott) will send an updated list of EBL children in Flint weekly
- GCHD (Sherry) will review list and assign EBL cases to CM
- Sherry will send contact information via email to MDHHS-Courtney
- MDHHS-Courtney will review and send to ETC (EBL Environmental Investigator (EI) Contractor) and an EI will be assigned to the case.
- GCHD CM will contact family to determine available scheduling dates/times.
    - CM will discuss how the family must prepare for the site visit, including the water sampling prep using following three step process to collect water samples:
        a. Scheduler will attempt to ensure water is not used for at least six hours prior to Contractor arrival in order to collect first draw water samples. The Contractor will send the family instructions on water use prior to the visit.
        b. If this step is unachievable, Contractor will ask family not to use the water during the site visit and will stay at the unit for a minimum of six hours and collect the first draw water sample at that time.
        c. If this step is unachievable, Contractor will schedule a return visit for early morning time to collect the first draw water samples.
- GCHD CM will contact John DeFabio at ETC 800-864-3236 and coordinate schedules to attend the initial site visit together.
- **On-site:**
    - The EI will draw water samples first thing to allow for family to use water thereafter.
    - The EI will conduct the Occupant Questionnaire
    - The EI will begin investigation, while
    - The CM provides case-management services to the family, including the presentation of the lead dust cleaning kit and associated education. If a HEPA vac is available through the EI, the CM will teach the family how to use the vac safely. Hopefully, this can be done while the EI is conducting the investigation and the vac can be taken back with them to alleviate pick up.
    - When the CM has completed the visit, she will leave the site. The EI will continue the investigation until complete. The CM will explain the procedure to the family prior to the first visit.
    - The EI will screen the family for eligibility into the MDHHS-Lead Safe Home Program (LSHP) for abatement of lead-based paint hazards (I have attached our LSHP application packet with eligibility requirements listed on the flier).
        1. If the family appears eligible for the LSHP, the application will be submitted to Courtney for processing.
        2. If the family is enrolled in the LSHP, Courtney will notify Sherry/CM via email.
        3. For the families that do not qualify for the LSHP, referral to other resources will be provided, if available.
    - The EBL Environmental Investigation is not reimbursed by Medicaid, therefore, MDHHS or ETC will not bill Medicaid for any services.

- GCHD requested that ETC provide the CM with a summary letter of the EI findings. Courtney confirming with ETC that this is possible.
- The CM is expected to perform at least two case-management visits and will continue to visit (home and phone) the family until the EBL child has two blood tests below 5 ug/dL.
- There are current testing events set-up with GCHD as follows:
    1. November 5 at GCHD-Burton Location from 8-12 noon and 1-4 pm.
    2. November 12 at Brownell School from 3-6 pm.
    3. ETC can be available to answer questions regarding investigations at some testing events.
- If an LSHP application is received at MDHHS for Flint and has an EBL child, Courtney will contact Sherry to see if any services have been provided by GCHD. If yes, MDHHS will order and EI. If no, ETC and the CM will coordinate schedules as discussed above.
- MDHHS CLPPP is providing training to the GCHD CM's on November 10, 2015. ETC and MDHHS staff will attend for a meet and greet of staff.

Genesee County Health Department

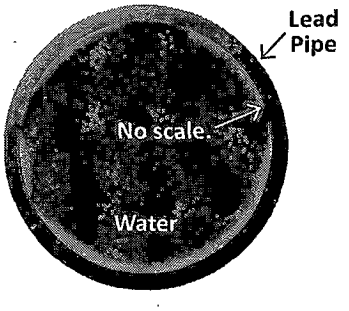
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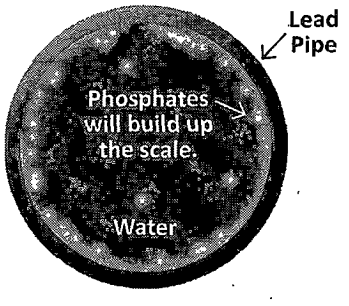
Adding Phosphate to Flint Water

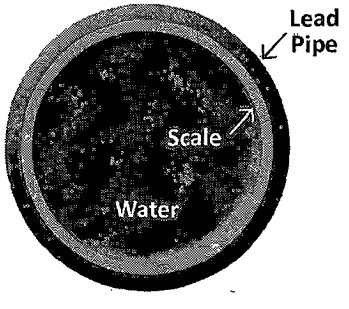
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- **Phosphorus is a natural mineral that your body needs. It works with calcium to keep your bones strong and healthy.**
- **Phosphate is a type of salt that has phosphorus in it.**
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- **The City of Flint, MDEQ, and the EPA worked together to find how much phosphate is needed to help quickly coat the pipes with scale.**
- **The levels of phosphate in your drinking water should be safe for everyone.**
- **We don't know how long it will take for the scale to build up.**
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If you have questions about the phosphate being added to City of Flint water, please call the Flint Water Department at 810-787-6537.
If you have questions about phosphate and your health, please call MDHHS at 1-800-648-6942.

Michigan Department of Health and Human Services
Protocol for Collecting Residential Drinking Water Samples for Lead Analysis
November 19, 2015

The following protocol will be used by the Michigan Department of Health and Human Services (MDHHS) to ensure that residential drinking water samples are collected in a systematic, consistent manner as part of an elevated blood lead (EBL) investigation. The results will be used to evaluate human exposure to lead in household drinking water and to identify plumbing components that are contributing lead to household drinking water.

MDHHS will:

- Collect water samples from the kitchen faucet used for drinking and cooking; a secondary faucet, most likely a bathroom sink; and any additional faucets based on frequency of use for consumptive purposes.
- Collect two small volume [125 milliliter (mL)] first-draw samples from selected cold faucet to evaluate exposure to lead in drinking water.
- Collect ten large volume [1 liter (L)] sequential samples from the kitchen cold faucet to identify plumbing components that are contributing lead to the household water supply.
- Incorporate the results of water testing into the EBL investigation report.

Before the EBL Inspection

Obtain information about the age of the house and any building additions. Identify if there are any records of previous water testing in the past two years. If possible, obtain information about the materials used in the water service line (lead, galvanized, copper or plastic).

Instruct residents not use any water in the house for any purpose (including toilet flushing) for at least 6 hours prior to sample collection.

Step 1 – Prior to Sample Collection

Sampling staff should confirm upon arrival at the home that no water has been used in the home for at least 6 hours prior to sample collection.

Step 2 – Identify and Label the Sample Faucets

- Identify the primary cold kitchen faucet.
- Identify a secondary cold faucet based on use: most likely a bathroom sink.
- Identify any additional cold faucets that are frequently used.

Identify each sampling location on the interior floor plan. Document each sampling location with digital photos, including the connections beneath the sink. Note the presence of any potential brass components or treatment devices, and whether the faucet has an aerator.

Document other noteworthy items for each location such as leaky faucet, rust stained sink, etc. Document any exposed plumbing in the basement, if possible.

If a temporary in-line filter is installed on the faucet, use the by-pass lever to collect unfiltered water samples. A whole house filter does not preclude sampling, as this is a permanent filter and representative of actual exposure.

Each water sample must be given a unique identification (ID) code that identifies the location of the faucet, the sample volume, and the order of sample collection.

Faucet location is indicated as follows:

- KF = kitchen faucet, cold
- BF = bathroom faucet, cold
- OF = other faucet, cold (specify type)

The two 125-mL first draw samples are labeled in order of collection P1 and P2. For example, the ID codes for the bathroom faucet samples would be BF-P1 and BF-P2.

The 10 large volume 1-L sequential samples collected from the kitchen faucet are labeled A1 through A10. For example, the first sequential sample at the kitchen faucet is labeled KF-A1, the second is labeled KF-A2 ... through KF-A10.

Step 3 – Collect the Small Volume Samples

Before sample collection:

1. Write the assigned ID code on each sample bottle's green label using a black Ultra Fine Point Sharpie permanent marker. To ensure clarity for the DEQ lab, draw a slash mark through each zero, the number one is a straight vertical line (no hat or foot), and cross each number seven.
2. Next, remove the cap from each bottle and label using a red Fine Point Sharpie permanent marker. Write '1' on the white cap of the bottle marked as P1; write '2' on the cap of the bottle marked as P2. Caps must be placed open side up to avoid contamination when not on the bottle.
3. Complete the *Request for Analysis* forms for each sample using a pen, pencil or black Sharpie. If the Lead and Copper analyses is not already selected, mark as 32CC for the 125-mL samples.

Collect 125-mL samples from all secondary faucets before collecting any samples from the primary kitchen faucet. Collect the P1 sample as the very first-draw from each faucet, followed by the P2 sample.

DO NOT REMOVE THE AERATOR IF THERE IS ONE, but make a notation that there is an aerator present.

Sample collection:

1. Place the P1 bottle under the faucet, open the faucet to produce a moderate, steady stream and fill the first bottle to the appropriate level. Immediately fill the P2 bottle without a break in the stream (do not turn off the faucet between the first and second bottle and do not allow water to run down the drain in between the first and second bottle if at all possible).
2. Turn off faucet. Cap each sample bottle making sure to match the P1 sample to the '1' white cap, and the P2 sample to the '2' white cap.
3. Secure the appropriate request for water analysis form to each bottle (refer to the example bottle provided for "instructions") with a rubber band.
4. Bundle the P1 and P2 samples collected at each faucet (after the proper paperwork has been banded to each bottle) and secure them together with a single rubber band.

Step 4 – Collect the Large Volume Samples

After all 125-mL samples have been collected; collect ten sequential 1-L samples from the kitchen cold faucet.

Before sample collection:

1. Write the assigned ID code on each sample bottle's green label using a black Ultra Fine Point Sharpie permanent marker. To ensure clarity for the DEQ lab, draw a slash mark through each zero, the number one is a straight vertical line (no hat or foot), and cross each number seven.
2. Next, remove the cap from each bottle and label using a red Fine Point Sharpie permanent marker. Write 1 through 10 on the white caps of the 1-L bottles for the A1 through A10 sequential samples. Caps must be placed open side up to avoid contamination when not on the bottle.
3. Complete the Request for Analysis forms for each sample using a pen, pencil or black Sharpie. If the Lead and Copper analyses is not already selected, mark as 36CC for the 1-L samples.

Sample collection:

1. Place the A1 bottle under the faucet, open the faucet to produce a moderate, steady stream and fill the first bottle to the appropriate level. Immediately fill bottles A2 to A10 consecutively without a break in the stream (do not turn off the faucet between bottles and do not allow water to run down the drain between the bottles).

2. After all 1-L samples are collected, turn off faucet. Cap each sample bottle making sure to match the A1 sample to the '1' white cap, the A2 sample to the '2' white cap and so forth.

3. Secure the appropriate request for water analysis form to each bottle (refer to the example bottle provided for "instructions") with a rubber band.

Step 5 - Deliver all sample bottles to the Michigan Department of Environmental Quality (MDEQ) Drinking Water Laboratory.

The attached map provides directions to the State Laboratory located at 3350 North M.L. King Blvd., Lansing, Michigan. Access is available Monday to Friday from 7am to 5pm, but after-hours deliveries may be pre-arranged by calling during business hours.

Contact Julia Pieper at 517-335-8076 or pieperj2@michigan.gov, or the Laboratory at 517-335-8184 to provide driver names and estimated time of arrival to the security team so that drivers can be cleared for entrance.

Drivers must present ID (driver's license) at the entrance security gate.

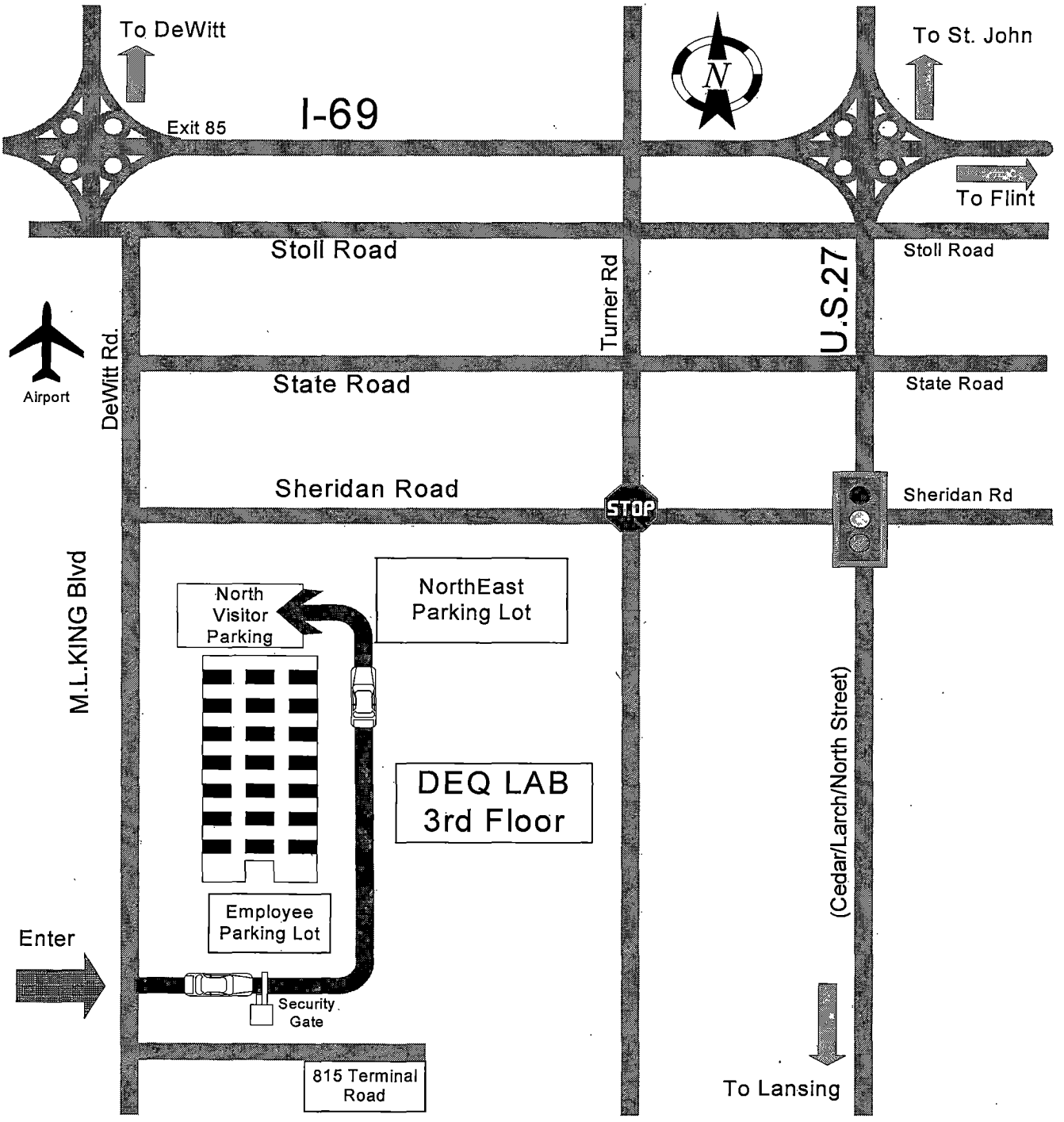
The DEQ Drinking Water Laboratory will analyze all water samples in accordance with the Laboratory Services Standard Operating Procedure (SOP) Document SOP #800 Revision #4 Effective Date 10/2015.

Applicable analytical methods will be in accordance with the *Method for Determination of Metals in Environmental Samples, Supplement I,* U.S. Environmental Protection Agency, Method 200.8, 1999 Revision 5.5.

All Method Detection Limits shall be performed according to Title 40 of the Code of Federal Regulations, Part 136, Guidelines Establishing Testing Procedures for the Analysis of Pollutants, Appendix B, Definition and Procedure for the Determination of the Method Detection Limit.

Analytical quality control will be in accordance with SOP #800 Revision #4.

Entry To The State Laboratory: Contact Julia Pieper at 517-335-8076 or pieperj2@michigan.gov, or call the Laboratory at 517-335-8184 to provide driver's name and arrival time. You will be asked to show your ID to the camera at the security gate upon entering the lot, the guard will have your name for entry and will contact the specified lab employee to meet you in the lobby. Follow the drive to the north visitor lot and enter the lobby via the double doors facing east.



File: Map Security Information
11/19/15, 9:40 AM

Temporary waiver for NPDES discharge limits - ?

EBL investigations -

screening.

decision tree - draft Kong/Jennifer

how the schools complied with the - are fountains correct models if not pull out of service.

EPA IEUBK model - uses ~~adapted~~ std. algorithms.

5 ug/deciliter action level - blood

* older Pb level are data
* cord blood data - may be over watched
* natural blood level - None data set
  if DW < 2 ppb ok
  DW > 15 ppb - do not use
  DW between 2-15 other practicing measures.

all schools on bottled water
United Way coordinating these efforts

Zero water Pitcher Filters for every classroom by Monday

* Each DW fountain fctn installed or in-line bubbly system installed

water w/city of Flint

need to test first

LSL replacements –

draft flyer – for residents

mini-grants to residents to help replace LSLs.

- ARSDE - not under competitive agreement

→ check w/ Jen re: funding.

Jennifer

Health educ.

Shekter Smith, Liane (DEQ)

From: Dykema, Linda D. (DCH)
Sent: Tuesday, July 28, 2015 3:25 PM
To: Shekter Smith, Liane (DEQ); Busch, Stephen (DEQ)
Subject: FW: Director's Office Assignment -- Flint - need update asap
Attachments: Flint Testing and EBLLs_2.xlsx

Hi,

I just wanted to make you aware of this analysis.

Linda D. Dykema, Ph.D.
Environmental Public Health Director
Division of Environmental Health
Michigan Department of Health & Human Services
517.335.8566
dykemal@michigan.gov

-----Original Message-----
From: Peeler, Nancy (DCH)
Sent: Tuesday, July 28, 2015 2:57 PM
To: Anderson, Paula (DCH); Miller, Corinne (DCH); Travis, Rashmi (DCH); Moran, Susan (DCH); Grijalva, Nancy (DCH); Fink, Brenda (DCH)
Cc: Priem, Wesley F. (DCH); Dykema, Linda D. (DCH); Bouters, Janese (DCH); Barr, Jacqui (DCH)
Subject: RE: Director's Office Assignment -- Flint - need update asap

I apologize for the delay in responding more specifically to this assignment, it took some time to review our Childhood Lead Poisoning Prevention program data to see if it might contribute to the understanding of the situation in Flint with their water supply. Here is what we found:

We looked at lead testing results for May 2014-April 2015, which is the 12 month time frame just after Flint started drawing their water from the river (water source changed in April 2014). We compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –

- Lead testing rates remained about the same from year to year (chart on the right).
- There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).
- However that pattern was not terribly different from what we saw in the previous three years, especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).
- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspect that the summer data spike may be related to this effect.
- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015.

So upon review, we don't believe our data demonstrates an increase in lead poisoning rates that might be attributable to the change in water source for Flint. We recognize that lead exposure via the water is only a small piece of what may be happening for families in Flint, however, we hope the information is helpful.

Nancy Peeler

-----Original Message-----
From: Anderson, Paula (DCH)
Sent: Wednesday, July 22, 2015 5:31 PM
To: Miller, Corinne (DCH); Travis, Rashmi (DCH)
Cc: Priem, Wesley F. (DCH); Dykema, Linda D. (DCH); Peeler, Nancy (DCH); Bouters, Janese (DCH); Barr, Jacqui (DCH)
Subject: Director's Office Assignment -- Flint - need update asap
Importance: High

Good afternoon,
Please see the message below received from the Director's office just before 5. If at all possible, please provide an update of what you may, or may not, know ASAP, today if at all possible. Include Nancy Grijalva and Sue Moran in the response. Thank you.

-----Original Message-----
From: Miller, Mark (DCH)
Sent: Wednesday, July 22, 2015 5:28 PM
To: Anderson, Paula (DCH)
Subject: RE: Flint - need update asap

There's an article from the metro times I located:

http://www.metrotimes.com/Blogs/archives/2015/07/14/flint-family-finds-hazardous-waste-levels-of-lead-in-its-tap-water

Based on this it sounds like at least one family might have had a child with elevated lead blood levels, which might or might not have come from the water. Sounds like the issue is old lead service lines, but their seems to be some difference of opinion on appropriate testing methods.

I'd send this over to Linda Dykema, Wes Priem and Nancy Peeler for their comments.

DEQ has jurisdiction over municipal water supplies, but we do have a program to follow-up on children with elevated blood lead levels, so I think it would be appropriate for the folks above to discuss the situation and recommend any action.

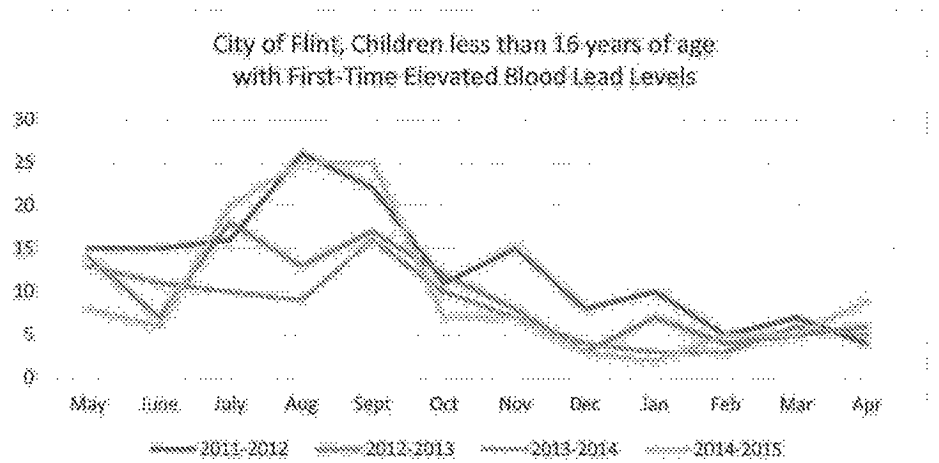
Mark

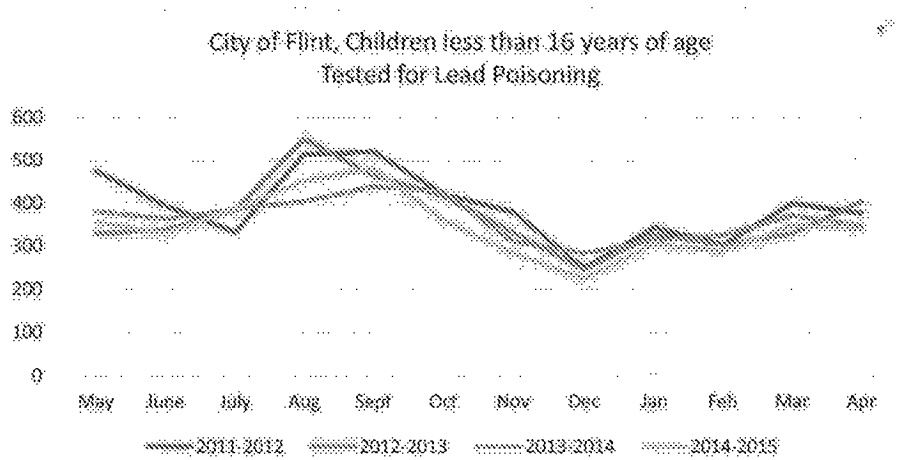
-----Original Message-----
From: Anderson, Paula (DCH)
Sent: Wednesday, July 22, 2015 4:51 PM
To: Miller, Mark (DCH)
Cc: Moran, Susan (DCH)
Subject: FW: Flint - need update asap
Importance: High

Nancy requested an answer TODAY. Thanks.

-----Original Message-----
From: Grijalva, Nancy (DCH)
Sent: Wednesday, July 22, 2015 4:47 PM
To: Moran, Susan (DCH)
Cc: Anderson, Paula (DCH)
Subject: FW: Flint - need update asap

I'm frustrated by the water issue in Flint. I really don't think people are getting the benefit of the doubt. Now they are concerned and rightfully so about the lead level studies they are receiving from the DEQ samples. Can you take a moment out of your impossible schedule to personally take a look at this? These folks are scared and worried about the health impacts and they are basically getting blown off by us (as a state we're just not sympathizing with their plight).





	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
2011-2012	15	15	16	26	22	11	15	8	10	5	7	4
2012-2013	14	7	18	13	17	12	8	3	7	4	5	6
2013-2014	13	11	10	9	16	10	7	4	3	3	6	5
2014-2015	8	6	20	25	25	7	7	3	2	5	5	9

	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
2011-2012	474	393	332	513	520	420	379	249	343	303	339	375
2012-2013	328	338	383	550	464	417	332	246	328	303	328	402
2013-2014	380	363	385	404	438	427	310	283	313	325	371	346
2014-2015	356	329	386	452	480	361	283	224	305	287	348	339

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Lead in Drinking Water and Human Blood Lead Levels in the United States

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

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Lead in Drinking Water and Human Blood Lead Levels in the United States

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Introduction

Lead is a pervasive environmental contaminant. The adverse health effects of lead exposure in children and adults are well documented, and no safe blood lead threshold in children has been identified. Lead can be ingested from various sources, including lead paint and house dust contaminated by lead paint, as well as soil, drinking water, and food. The concentration of lead, total amount of lead consumed, and duration of lead exposure influence the severity of health effects. Because lead accumulates in the body, all sources of lead should be controlled or eliminated to prevent childhood lead poisoning. Beginning in the 1970s, lead concentrations in air, tap water, food, dust, and soil began to be substantially reduced, resulting in significantly reduced blood lead levels (BLLs) in children throughout the United States. However, children are still being exposed to lead, and many of these children live in housing built before the 1978 ban on lead-based residential paint. These homes might contain lead paint hazards, as well as drinking water service lines made from lead, lead solder, or plumbing materials that contain lead. Adequate corrosion control reduces the leaching of lead plumbing components or solder into drinking water. The majority of public water utilities are in compliance with the Safe Drinking Water Act Lead and Copper Rule (LCR) of 1991. However, some children are still exposed to lead in drinking water. EPA is reviewing LCR, and additional changes to the rule are expected that will further protect public health. Childhood lead poisoning prevention programs should be made aware of the results of local public water system lead monitoring measurement under LCR and consider drinking water as a potential cause of increased BLLs, especially when other sources of lead exposure are not identified.

This review describes a selection of peer-reviewed publications on childhood lead poisoning, sources of lead exposure for adults and children, particularly children aged <6 years, and LCR. What is known and unknown about tap water as a source of lead exposure is summarized, and ways that children might be exposed to lead in drinking water are identified. This report does not provide a comprehensive review of the current scientific literature but builds on other comprehensive reviews, including the *Toxicological Profile for Lead* and the 2005 CDC statement *Preventing Lead Poisoning Among Young Children* (*1,2*). When investigating cases of children with BLLs at or above the reference value established as the 97.5 percentile of the distribution of BLLs in U.S. children aged 1–5 years, drinking water should be considered as a source. The recent recommendations from the CDC Advisory Committee on Childhood Lead Poisoning Prevention to reduce or eliminate lead sources for children before they are exposed underscore the need to reduce lead concentrations in drinking water as much as possible (*3*).

Background

Lead is a relatively corrosion-resistant, dense, ductile, and malleable metal that has been used by humans for at least 5,000 years. During this time, lead production has increased from an estimated 10 tons per year to 1,000,000 tons per year, accompanying population and economic growth (*4*). The estimated average BLL for Native Americans before European settlement in the Americas was calculated as 0.016 μg/dL (*5*). During 1999–2004, the estimated average BLL was 1.9 μg/dL for the noninstitutionalized population aged 1–5 years in the United States (*6*), approximately 100 times higher than ancient background levels, indicating that substantial sources of lead exposure exist in the environment.

BLLs of U.S. children increased sharply during 1900–1975 as increased lead use and emissions caused widespread environmental contamination across the United States. Changes in federal laws to limit the use and emissions of lead have reversed this trend. Effective regulations include reducing or eliminating lead from gasoline for on-road vehicles, foods and food packaging, house paint, water pipes, plumbing fixtures, and solder used in plumbing and drink cans.

Effects of Lead Exposure

Effects on Children

The health consequences of lead exposure depend on the cumulative dose of lead and vulnerability of the individual

person rather than the environmental media (i.e., food, water, soil, dust, or air) in which the lead exists. Compelling evidence has established the cognitive effects of childhood lead exposure since they were first described in 1943 (*7*). To date, no safe blood lead threshold for the adverse effects of lead on infant or child neurodevelopment has been identified (*2*). Recent evidence suggests that the dose-effect relationship might be supralinear, with a steeper dose response and potential risk for an adverse health effect such as IQ loss at BLLs <10 μg/dL compared with BLLs ≥10 μg/dL (*8–10*). The developing fetus and child are more sensitive to lead exposure than adults because of the immaturity of the blood-brain barrier, increased gastrointestinal absorption, and hand-to-mouth behaviors, all of which increase exposure (*11*). Comorbidities such as iron deficiency also can enhance lead absorption.

Evidence from several prospective studies suggests that the adverse effects of early childhood exposure on neurodevelopment persist into the second decade of life (*12–16*). The mechanisms by which low levels of lead exposure might adversely affect neurobehavioral development remain uncertain, although experimental data support the involvement of many physiological pathways.

Effects on Adults

Overall. Adults with occupational exposure to lead report more colds and influenza and exhibit suppressed secretory immunoglobulin A (IgA) levels, demonstrating lead-induced suppression of humoral immunity (*17*). Adults with occupational exposure also might have neurotoxic effects, including peripheral neuropathy. Motor nerve dysfunction can occur at BLLs as low as 40 μg/dL (*18*). Lead also is nephrotoxic and can cause progressive nephron loss leading to renal failure, gout, and hypertension. In a meta-analysis of the relationship between BLL and blood pressure, a small but statistically significant association between increased BLL and increased blood pressure was identified (*19*). BLLs ≥40 μg/dL have been associated with increased risk for cardiovascular, cancer, and all-cause mortality in several epidemiological studies. These effects might not be limited to adults with the long-term, high-dose exposure common in occupational settings. A study of approximately 13,000 adult participants in the third National Health and Nutrition Examination Survey (NHANES) with 12 years of follow-up found that adults in the highest tertile of BLL (≥3.6 μg/dL) were at increased risk for all-cause mortality and cardiovascular mortality but not for cancer mortality compared with those in the lowest tertile of BLL (<1.9 μg/dL) (*20*).

Reproductive and Prenatal Effects. Lead exposure remains a concern for pregnant and lactating women, particularly those who have an occupational exposure to lead, who are recent immigrants, who are engaged in home renovations, or who have pica. Prenatal lead exposure resulting in maternal BLLs <10 μg/dL has measurable adverse effects on maternal and infant health, such as fertility, hypertension, and infant neurodevelopment (*21*). In addition, because lead persists in bone for decades, as bone stores are mobilized to meet the increased calcium needs of pregnancy and lactation, women and their infants might be exposed to lead long after external sources have been removed (*22*). Adverse reproductive effects are not limited to women. In males with occupational lead exposure, abnormal sperm morphology and decreased sperm count have been observed at BLLs <40 μg/dL (*23*).

Carcinogenic Effects

Based on limited evidence from studies in humans and sufficient evidence from animal studies, the U.S. Department of Health and Human Services (HHS) has determined that lead and lead compounds are reasonably anticipated to be human carcinogens, and the U.S. Environmental Protection Agency (EPA) has determined that lead is a probable human carcinogen. The International Agency for Research on Cancer also has determined that inorganic lead is likely carcinogenic in humans (*1*).

Scope of Public Health Concern

In 2004, 143,000 deaths and a loss of 8,977,000 disease-adjusted life years were attributed to lead exposure worldwide, primarily from lead-associated adult cardiovascular disease and mild intellectual disability in children (*24*). Children represent approximately 80% of the disease impact attributed to lead, with an estimated 600,000 new cases of childhood intellectual disabilities resulting from BLLs ≥10 μg/dL each year (*25*).

In 1987, one study estimated that reducing water lead levels to below the maximum contaminant level for lead (which was 20 parts per billion [ppb] during 1986–1991) would save nearly $400 million per year (1985 dollars) (*26*). Although estimates of the reductions in lead concentrations for various media, air, dust, soil, and water are unavailable, reductions in BLLs were observed for each subsequent cohort of children aged 2 years who were not exposed to lead at the concentrations experienced by the cohort of children aged 2 years in 1976. As a result of the overall reduction of lead in the environment, including fuel, house paint, and drinking water, there was an estimated decrease in BLLs of 15.1 μg/dL and a related estimated economic benefit of $110–$300 million in earnings for children born after 1976 who were not exposed to high levels of lead (*27*). A recent cost-benefit analysis suggested that for every dollar spent to reduce lead hazards, $17–$220 is saved. This cost-benefit ratio compares favorably to that of other public health interventions such as vaccines (*28*).

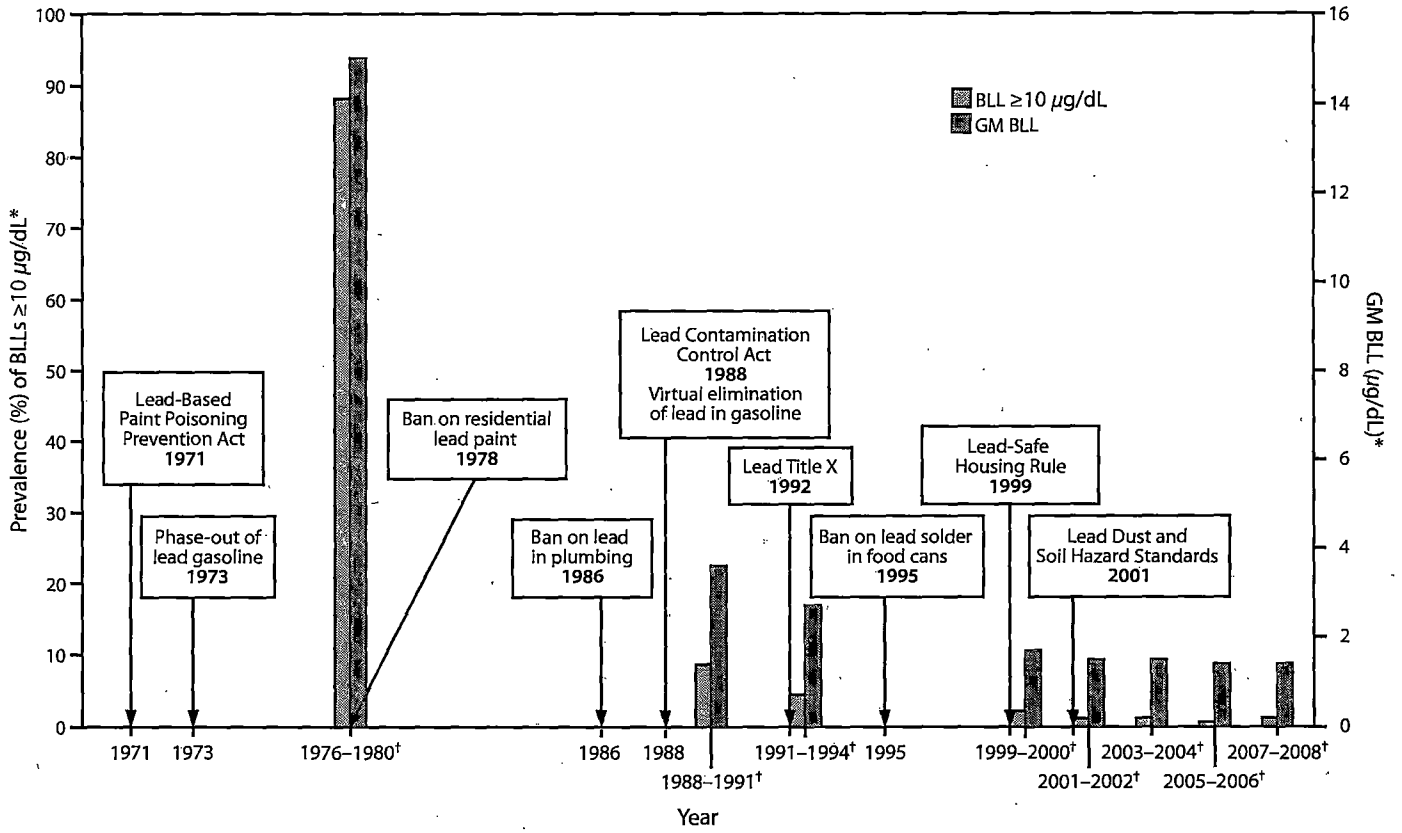
Historical Trends in Blood Lead Levels

Since the 1970s, NHANES data have been used to track BLLs for the noninstitutionalized U.S. population (Figure). In 1978, approximately 13.5 million children aged 1–5 years had BLLs ≥10 μg/dL, which is generally considered the threshold for housing inspection, health education, and home visits (i.e., case management) by local and state public health agencies. By 2007–2008, this number had decreased to approximately 250,000 (*29*). In addition, in the early NHANES data from the 1970s and 1980s, 12% of black children had BLLs ≥30 μg/dL, compared with 2% of their counterparts who were white. Children living in low-income families also were at greater risk for BLLs ≥30 μg/dL (10% of children in households earning <$6,000 per year compared with 1.2% living in households earning >$15,000 per year) (*30*). By the 1999–2004 surveys, the percent differences in BLLs ≥10 μg/dL for children aged 1–5 years, by race and family income, were no longer statistically significant, a trend that continues today at levels ≥10 μg/dL, demonstrating the impact of policies at the federal, state, and local levels (*6*).

In the 1991–1994 NHANES, the overall prevalence of BLLs ≥10 μg/dL was 2.2% but decreased to 0.7% by the 1999–2002 survey. Overall, the geometric mean (GM) decreased significantly ($p<0.05$; two-tailed t-test) from 2.3 μg/dL to 1.6 μg/dL during the same time period. Among children aged 6–12 years, boys had significantly higher GM BLLs than girls in all age, racial, and income groups (*6*).

Despite the considerable progress in decreasing BLLs, children aged <6 years continue to be exposed to lead. Although disparities among various subpopulations of children with

FIGURE. Timeline of lead poisoning prevention policies and blood lead levels in children aged 1–5 years, by year — National Health and Nutrition Examination Survey, United States, 1971–2008



Abbreviations: BLL = blood lead level; GM = geometric mean; NHANES = National Health and Nutrition Examination Survey.

Sources: Mahaffey KR, Annest JL, Roberts J, Murphy MS. National estimates of blood lead levels: United States (1976–1980). N Engl J Med 1982;307:573–9. Jones R, Homa D, Meyer P, et al. Trends in blood lead levels and blood lead testing among U.S. children aged 1 to 5 years: 1998–2004. Pediatrics 2009;123:e376-85. National Health and Nutrition Examination Survey, 2000–2008. Available at http://www.cdc.gov/nchs/nhanes.htm. Accessed July 17, 2012.

* National estimates for GM BLLs and prevalence of BLLs ≥10 μg/dL, by NHANES survey period and sample size of children aged 1–5 years: 1976–1980: N = 2,372; 1988–1991: N = 2,232; 1991–1994: N = 2,392; 1999–2000: N = 723; 2001–2002: N = 898; 2003–2004: N = 911; 2005–2006: N = 968; 2007–2008: N = 817.

† NHANES survey period.

BLLs ≥10 μg/dL are no longer significant, disparities in risk for exposure have persisted over time. In addition, mean BLLs continue to be higher for children from low-income families, non-Hispanic black children, and children living in older housing (i.e., built before 1950) (*6*). For example, the mean BLL for non-Hispanic black children (1.9 μg/dL) was significantly higher (36%) than that of white children (1.4 μg/dL) during 2007–2008.

Although the decrease in GM BLLs in women aged 20–59 years from 1.8 μg/dL in 1988–1994 to 1.2 in 1999–2002 was similar to that seen in children, in utero exposure is also a substantial public health issue for certain populations, particularly new immigrants (*31–33*). In a 2003 study conducted in New York City, New York, BLLs ≥5 μg/dL were more prevalent among pregnant women who were born outside the United States than pregnant women born in the United States (odds ratio = 8.2, 95% confidence interval = 3.8–17.3) (*34*).

Lead in the Environments of Children

A review of the sources of lead in the environments of U.S. children discusses the contributions of various lead-contaminated media to BLLs in children (*35*). Deteriorating lead paint and lead in house dust and soil are the primary, and often the most concentrated, sources of lead. However, lead paint contamination is not the only source of exposure for U.S. children.

Lead is used in thousands of applications, each constituting a potential exposure source (*36*). Case reports from local and state lead programs indicate that up to 30% of children with BLLs ≥10 μg/dL do not have an immediate lead paint hazard. For example, in 2004 in Arizona, lead-contaminated soil was the most commonly identified proximate exposure source, accounting for approximately 24% of increased BLLs in children, followed by paint (17%), folk remedies and pottery (17%), dust (15%), and miscellaneous other sources (19%). In 8% of cases, no lead hazard was identified (*37*).

In field investigations, nonpaint lead exposure sources might be insufficiently characterized and their importance underestimated. Lead program inspectors look for lead paint hazards in places where children with BLLs ≥10 μg/dL spend time. Often, lead exposure sources other than paint are sought only when no lead paint hazards are found. Of 35 CDC-funded childhood lead poisoning prevention programs, only 15 reported that they routinely tested lead levels in water in homes where children have increased BLLs (CDC, unpublished data, 2009). Thus, for some children with BLLs ≥10 μg/dL, important nonpaint sources such as water might not be identified.

Evidence also suggests that for children with BLLs 5–9 μg/dL, no single source of exposure predominates. For these children, the contribution of multiple sources, including drinking water, seems likely, particularly for children who do not have well-established risk factors such as living in old housing or having a parent who is exposed to lead at work (*38*). CDC and its Advisory Committee on Childhood Lead Poisoning Prevention concur that primary prevention of lead exposure is essential to reducing high BLLs in children and that reducing water lead levels is an important step in achieving this goal.

Lead in Drinking Water

Lead is unlikely to be present in source water unless a specific source of contamination exists. However, lead has long been used in the plumbing materials and solder that are in contact with drinking water as it is transported from its source into homes. Lead leaches into tap water through the corrosion of plumbing materials that contain lead (*26,39*). The greater the concentration of lead in drinking water and the greater amount of lead-contaminated drinking water consumed, the greater the exposure to lead. In children, lead in drinking water has been associated both with BLLs ≥10 μg/dL (*40,41*) as well as levels that are higher than the U.S. GM level for children (1.4 μg/dL) but are <10 μg/dL (*42–44*)

History of Studies on Lead in Water

In 1793, the Duke of Württemberg, Germany, warned against the use of lead in drinking water pipes, and in 1878, lead pipes were outlawed in the area as a result of concerns about the adverse health effects of lead in water (*45*). In the United States, the adverse health consequences of lead-contaminated water were recognized as early as 1845 (*46*). A survey conducted in 1924 in the United States indicated that lead service lines were more prevalent in New England, the Midwest, Montana, New York, Oklahoma, and Texas (*47*). A nationwide survey conducted in 1990 indicated that 3.3 million lead service lines were in use, and the areas where they were most likely to be used were, again, the midwestern and northeastern regions of the United States. This survey also estimated that approximately 61,000 lead service lines had been removed through voluntary programs during the previous 10 years (*48*).

Research on exposure to lead in water increased as concern about the topic increased, and efforts were made to establish a level of lead in water that, at the time of the studies, was considered acceptable. A 1972 study in Edinburgh, Scotland, obtained 949 first-flush water samples (i.e., samples of water from the tap that have been standing in the plumbing pipes for at least 6 hours)

matched with 949 BLLs, as well as 205 running water samples matched to 205 BLLs (*49*). No dose-response relationship could be determined when comparing BLLs with four levels of lead in both first-flush water and in running water (<0.24 µmol/L; 0.24–0.47 µmol/L; 0.48–1.43 µmol/L; and ≥1.44 µmol/L). The study concluded that the findings challenged whether it was necessary to lower the water lead concentration to <100 ppb, which at that time was the acceptable concentration established by the World Health Organization. However, the study also reported that low levels of environmental lead exposure could have adverse health effects; therefore, knowing the degree of lead exposure from household water relative to other sources is important. Another study, in 1976, of 129 randomly selected homes in Caernarvonshire, England, reported a similar finding (*50*), describing the relationship between blood and water lead as slight.

Comparing studies on the relationship between BLLs and lead levels in water are difficult given that the age of study participants, water sample collection methods, and duration of the exposure to high water lead levels vary considerably across studies. Quantifying the contribution of lead in water to BLLs in children can be particularly challenging because of the difficulty of collecting valid, reliable, and reproducible water lead samples. Relatively small fluctuations in factors such as temperature, pH alkalinity, and dissolved solids affect the solubility of lead (*51*). In addition, intake estimation is difficult because of the incomplete understanding of individual children's water intake patterns. Nonetheless, during the 1900s, an association between blood and water lead levels continued to be reported, particularly in sensitive populations such as pregnant women and children. For example, in the Glasgow Duplicate Diet Study, the correlation coefficient between infant BLLs at age 3 months and composite water samples was 0.59 (*52*). In a study of the association between children's BLLs and water lead levels, with a convenience sample of 320 households, water lead levels explained as much as 12% of the variance in BLLs (*53*). BLLs also were shown to decrease when lead lines were completely replaced. In one study comparing water lead levels in housing of low-income persons before and after lead service lines were replaced, water lead levels decreased by 50% in the 3 months after total replacement of lead pipes from the distribution systems (*54*).

In the 1983 British Regional Heart Study, the BLLs of 7,378 men in 24 British towns were evaluated (*55*). All men were categorized based on lead concentration in domestic water, water hardness, and alcohol and cigarette consumption. The findings indicated that when first-draw home tap water measured 100 ppb, BLLs of the men were 1.00 µmol/L, compared with 0.7 µmol/L in men with home tap water that contained undetectable lead levels. The study recommended that lead in water be given greater priority than in the past in any national campaign to reduce lead exposure. In a follow-up study in Glasgow, Scotland, tap water lead concentrations and maternal BLLs from 1981 were compared with water and BLLs from 1993 (*56*). In 1993, 17% of 1,812 homes had daytime, first-draw lead levels in 1 L of water that were ≥10 ppb, compared with 49% of 131 homes enrolled in a survey in 1981. Maternal BLLs decreased by 31% during the same period (11.9 µg/dL in 1981 vs. 3.7 µg/dL in 1993). Despite this decrease, the study reported that even the reduced levels of lead in tap water might have presented a risk for bottle-fed infants.

The lead studies discussed above exclusively assessed lead in water, and tap water was the only source considered as the cause of the increased BLL. One landmark U.S. observational study conducted during the 1990s studied 183 urban children aged 12–31 months (37%, 12–18 months; 31%, 18–24 months; 33%, 24–31 months) (*57*). Of these children, 63% had BLLs <10 µg/dL, 20% had BLLs of 10–14 µg/dL, 8% had BLLs of 15–19 µg/dL, and 3% had BLLs ≥20 µg/dL. The study evaluated lead in home foundation perimeter soils, potable water, paint, and house dust. Lead-contaminated house dust was the major contributor to BLLs ≥10 µg/dL. However, the study reported that although lead-contaminated water had a statistically significant effect on children's BLLs after adjusting for other sources of lead exposure, no statistically significant contribution for drinking water could be discerned at levels below the current EPA action level of 15 ppb (*57*). Lead dust as a primary source of lead for children with increased BLLs was further demonstrated in a subsequent pooled analysis of 12 studies; floor dust lead levels as low as 5 µg/ft^2 were associated with 5% of enrolled children having a BLL ≥10 µg/dL (*58*).

LCR and Control Measures

In 1991, EPA promulgated LCR. LCR sets an action level of 15 ppb of lead in 1 L of first-draw water taken after the water has been standing in the pipes for at least 6 hours. LCR also establishes a nonenforceable maximum contaminant level goal (MCLG) of 0, the level of lead in drinking water at which no adverse health effects are likely to occur. However, EPA has determined that MCLG is not feasible because many sources of lead in water are not under the control of public drinking water suppliers (i.e., water utilities). LCR requires water utilities to monitor lead in drinking water from a sample of customer taps in homes with plumbing materials that contain lead and copper. If >10% of the samples collected from a water utility serving <50,000 residents exceeds the lead action level, the utility must identify and install optimal corrosion control treatment. Utilities serving ≥50,000 residents are required to have optimal corrosion control treatment regardless of level

of lead in drinking water. Any size water utility exceeding the lead action level and covered by LCR is required to educate the public about lead in drinking water until water levels are below the lead action level. Utilities that exceed the action level must distribute public education materials on lead to customers and organizations that serve consumers with populations at high risk for adverse health effects from lead (e.g., schools, pediatricians, and child-care centers). The public education materials must include information about the health effects of lead, sources of lead, and steps persons can take to reduce their exposure to lead.

LCR requires that additional action be taken when a water utility with lead service lines and optimized corrosion control treatment still exceeds the action level in >10% of samples collected. In addition to public education, these utility companies also are responsible for replacing the portion of the lead service lines (the line connecting a house to the water distribution system) that the utility company owns. Utility companies must offer to replace the section of line owned by the customer (the section from the water meter into the house). However, the utility company is not required to bear the cost of replacing the privately owned portion of the line. When a customer does not agree to replacement of the privately owned portion of the line, the utility company must notify the residents at least 45 days in advance that they might experience a temporary increase in water lead levels as the portion of the service line owned by the utility company is replaced and must provide guidance on measures to minimize their exposure to lead. A utility company also must collect a water sample within 72 hours after completion of the partial replacement, test the sample for lead, and notify the customer of the results.

Most U.S. drinking water systems are in compliance with LCR. In 2004, the Congressional Research Service reported that an EPA review of its water monitoring data conducted during 2000–2003 did not find a systemic problem of increased lead levels among water systems. For systems that serve >50,000 persons, 27 (3.6%) of these systems exceeded the action level of 15 ppb at least once in the time period. For systems that served 3,300–50,000 people, 237 (3.4%) exceeded the action level at least once since 2000 (*59*). However, lead service lines remain in use in neighborhoods in many cities. These pipes range in age from those installed during the late 1800s through 1986, although the preponderance of lead service line installations occurred before World War II.

Changes in water treatment and disinfection practices can substantially undermine lead corrosion control (*60*). In the mid-1990s in the District of Columbia (DC), high levels of free chlorine were used to decrease coliform bacteria in water, a process that inadvertently changed the type of lead mineral coating in the water lines to one with very low solubility in the background pH of the DC drinking water. When the free chlorine was replaced with chloramines, the transformed highly insoluble lead scale minerals were no longer stable and dissolved. Therefore, a substantial level of lead was released from the lead service lines into drinking water at the tap (*61*). CDC reviewed the relationship between BLLs in children, the presence of a lead service line, and water disinfection practices in DC during 1998–2006 (*62*). The study reported that the presence of a lead service line was associated with higher BLLs in children. This relationship was most pronounced during 2001 through June 2004, when chloramines were used to disinfect the drinking water without adequate corrosion control (*62*). An observational study in which the BLLs of children were matched to population-based data of water lead levels during periods when water disinfection practices changed in DC concluded that the increase in water lead levels was associated with an increase in the BLLs of children (*63*). In a study in Wayne County, North Carolina, a unified geographic information system was used to link BLLs with water service lines made with or without lead. The use of chloramines in water predicted higher water lead levels and BLLs, controlling for well-established, known predictors of BLL (*64*).

Partial replacement of lead service lines might not effectively decrease the increased BLLs associated with lead service lines, as shown by one observational study in DC during July 2004–December 2006 that assessed the BLLs and type of water service line (*62*). Compared with children who had never had a lead service line, children having had a partial lead pipe replacement were at increased risk for increased BLLs, and BLLs of children with partial lead pipe replacement were not lower than those of children who lived in housing with a complete lead service line.

Water from systems that serve <25 persons and water from private drinking water wells is not regulated under the Safe Drinking Water Act, so LCR does not apply to these water sources, and they are not routinely tested for lead. Approximately 40–45 million people in the United States drink water that is not subject to the LCR regulations (*64*). The number of homes supplied by private wells or sources that serve <25 persons that have leaded plumbing, fixtures, or solder is unknown, as is the number of such homes that would benefit from appropriate corrosion control or water filtration at the point of use.

Since 1991, when LCR was finalized and enforced, tap water lead levels have substantially decreased (*65*). However, conditions still exist that could allow children to be exposed to water lead levels ≥15 ppb. Drinking water from systems with lead service lines that do not have optimized corrosion control might not be in compliance with LCR, which can result in this level of lead exposure. A system with lead service lines that is in compliance

with LCR can still expose children to lead levels ≥15 ppb because LCR permits ≤10% of sampled homes to exceed the action level of 15 ppb. Optimized corrosion control also might not completely prevent lead in plumbing materials from dissolving into drinking water. Persons who drink water from these sources might be exposed to lead levels >15 ppb.

Conclusion

Although EPA has the primary responsibility for ensuring the safety of drinking water, state and local childhood lead poisoning prevention programs are important partners in ensuring that the public is protected from lead exposure. These programs promote blood lead screening, conduct blood lead surveillance, provide clinician and public education and outreach, and provide case management for children with elevated BLLs. Because children with elevated BLLs might be exposed to many sources of lead, all sources of lead should be considered when their homes are inspected. Childhood lead poisoning prevention programs can obtain data on lead in public drinking water systems from the water suppliers (*66*). Drinking water in older housing should be tested as a source of lead exposure when the local drinking water system is not in compliance with LCR or when another source of lead exposure cannot be identified for children with high BLLs (*67*).

Data are not available to address certain issues regarding lead in drinking water. The effect of water lead levels on BLLs of children and other populations at risk for adverse effects is difficult to measure. Current water sampling protocols were designed to assess the adequacy of water treatment, not the level of human exposure to lead. Important fluctuations in water lead levels might be missed because of limitations inherent in sampling protocols developed for regulatory purposes. Future research efforts could validate the accuracy of sampling protocols for identifying fluctuations of lead concentrations, predicting exposure to lead at the individual level, and determining how best to measure lead concentrations in multifamily versus single-family homes, child care centers, and school settings. As new alternatives to lead in plumbing are developed, they should be evaluated before being marketed. More research, surveillance, and intervention studies also are needed to determine the most effective ways to reduce the lead concentration of drinking water to meet the goal of eliminating high BLLs in children.

Childhood lead poisoning prevention programs routinely provide information on practices that minimize exposure to lead in water. This information can be updated with additional materials promoting lead-safe plumbing practices. Training curricula for lead exposure assessment protocols and case-management guidelines for children with elevated BLLs should incorporate lead-safe water and plumbing information. Appropriate risk communication materials for water customers that are accurate and reflect specific language and cultural factors might be beneficial.

Partial lead service line replacement has been associated with short-term increases in lead levels in drinking water (*65*) and has not been found to decrease risk for BLLs ≥5 μg/dL in children (*62*). These findings imply that the practice of partially replacing lead service lines as a method to comply with LCR should be reconsidered. One alternative is full replacement of lead service lines, regardless of whether the lead service line is owned by the water authority or the property owner. Lower BLLs could be achieved if plumbing components contained the lowest possible levels of lead and monitoring and enforcement activities were effective. Finally, information about lead in plumbing components, often available in tax assessor data, could be incorporated into information routinely provided to homebuyers or renters before they make the decision to buy or rent a property.

Since 1970, considerable reductions in lead concentrations have occurred in air, tap water, food, dust, and soil, which significantly reduced the BLLs of children throughout the United States. However, children are still being exposed to lead, and no safe blood lead threshold for children has been identified.

All sources of lead in the environments of children should be controlled or eliminated (*2*). For the many children living in housing built before 1978, lead sources include lead paint hazards as well as lead in plumbing components and fixtures. Children can still be exposed to tap water with lead levels of ≥15 ppb if they live in older homes that are more likely to have lead water pipes or fixtures. To prevent lead exposure from tap water, persons involved with childhood lead poisoning prevention programs should be familiar with communities having buildings at high risk for lead and monitor whether local water providers are in compliance with LCR (*66*). EPA is currently reviewing LCR, which provides an opportunity for continued collaboration between EPA and CDC that focuses on reducing the public health consequences of exposure to lead in water.

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After talking with Linda and Liane (separately) - here is the latest plan for the phosphate factsheet

The overall conceptual change is to

1. Tuesday- ask Michelle to make the following conceptual changes to the factsheet
    a. Concepts to convey (language provide is only concepts – not the wording being requested)
        i. The type of phosphate being put in Flint water is for corrosion inhibition, which means that it will help reduce the amount of metals coming off of piping, including lead.
        ii. The only way to prevent lead from being in the water is to remove the sources of lead from the piping which runs from the service line to various parts of the plumbing and fixtures in the home.
        iii. The phosphate being added "builds up a coating on the pipes" which reduces the metals going into the water.
        iv. Phosphorus is a nutrient and part of one's diet.
    b. Concept that we cannot know
        i. Current status of flint piping, what happened, and what will result in the end.

2. Wednesday - Jen and Kory (Michelle has a meeting Scheduled) will go to DEQ to talk with Liane and show her the new draft. Best if I could send a draft ahead of time.

Liane is going to ask for the CAS # -- apparently the product being used has to be approved by the NSF and they should have a technical support document.

DRAFT – WORK IN PROGRESS

Protocol for Collecting Water Samples at Homes for Lead Analysis for an Exposure Assessment

The following procedure is to be used by the Michigan Department of Health and Human Services to ensure samples from homes on city of Flint water are collected in a systematic, consistent manner to provide meaningful results when performing an elevated blood level (EBL) investigation. By following the below procedures, health officials will have information to provide to a resident to be able to identify and correct sources that contribute lead into drinking water. The sampling procedures being used are:

- Conduct an on-site assessment of the building plumbing to identify plumbing components of concern.
- Select sample sites based on which taps are primarily used for drinking and cooking. At a minimum, the kitchen sink must be used and a second tap, most likely a bathroom, selected based on the most use.
- Label each tap with a unique code.
- Collect small volume [125 milliliter (ml)] samples from each sampling site beginning with any taps other than the kitchen. Finish collecting small volume samples from the kitchen tap as described below.
- Collect large volume [1 liter (l)] samples from the kitchen tap.
- Submit the samples and appropriate paperwork to a certified drinking water laboratory.

Step 1 – On-Site Plumbing Assessment

Upon arrival on-site, some items to look for and note:

- Identify where the water service enters the building. Typically, this will be where the meter is located.
- What is the service line material made of? Options include: lead, galvanized, copper, or plastic.
- What year was the home built?
- Have there been additions? If built since 1986, were lead-free plumbing and solder used?
- What are the potable water pipes in the facility made of and what is their location? Options include: lead, brass, copper, plastic, galvanized metal and other materials. What materials were used to solder the potable water pipes in the system? Are brass taps, fittings or valves used? Note the locations.
- How many of the following outlets provide water for consumption: Kitchen taps, bathroom taps, and icemakers. Note their location. Include taps that might be used for making coffee or preparing formula.
- Do faucets have accessible screens and have they been cleaned?
- Is any electrical equipment grounded to water pipes?
- Are there any records of previous water testing?

Step 2 – Prior to Sample Collection

The evening prior to samples being collected, residents in the home must be instructed to not use any water in the house after midnight. No water should be disturbed for any purpose prior to samples being collected. The minimum stagnation time should be 6 hours and it should not exceed 18 hours.

Sampling staff should confirm when they arrive in the morning that no water has been used in the home since the evening before.

Step 3 – Identify Taps to be Sampled

- Include a second tap/faucet based on what is primarily used. Most likely this will be a bathroom.
- Sample the secondary (most likely a bathroom) tap first. Only small volume samples will be taken here.
- The kitchen faucet must be sampled last because small volume and large volume samples will be taken from this tap.
- Only cold water taps should be sampled.

Each sampling location must be given a unique sampling code. A sample site identification (ID) number for each sample site will identify the order in which each site is to be sampled. The ID number will reflect the type of tap/outlet and location. Each sampling location will be documented with digital photos, if possible. If potential brass devices are seen they should be noted.

Step 4 - Labeling the Sample Sites and Preparing Labels for the Bottles

The following sampling identification scheme is recommended:

- KC = kitchen faucet, cold
- BF = bathroom faucet cold

In addition to the unique outlet code, a unique sample identifier is necessary since multiple samples will be taken from each faucet.

For example, there will be two small volume first draw samples taken from each faucet. Small volume first draw samples should be labeled in order of collection P1 and P2. If these samples are collected at a bathroom faucet the sample identifier would be BF-P1 and BF-P2.

Large volume consecutive samples taken at the kitchen faucet (after the small volume samples were collected) should be labeled A1 through A10. For example, the first consecutive sample at the kitchen sink would be KC-A1 and the second sample would be identified as KC-A2 … through KC-A10.

Step 5 – Collect the Small Volume Samples

Sampling containers will be provided by the Michigan Department of Environmental Quality (MDEQ) Drinking Water Laboratory.

1. Collect all water samples before proceeding with normal use of the water supply. Ideally, the water should sit in the pipes unused for at least 6 hours but not more than 18 hours before a sample is collected.

2. Two small volume samples [125 milliliter (ml) samples] will be collected from each designated sample site. Sample units for this evaluation/survey will be designated 32CC.

3. Notes should be taken at each sampling location regarding any treatment device that may be present (e.g., is there whole house treatment present) and whether the outlet/tap has an aerator present. Document other noteworthy items for each location such as leaky faucet, rust-stained sink, etc.

4. Do not sample from a faucet with an in-line filter, since these are assumed to be temporary and will skew the results. It is okay to sample if there is a whole house filter, as this is a permanent filter and representative of actual exposure. (Note – these samples are being used to evaluate exposure and cannot be used to determine compliance with the lead/copper rule).

5. **DO NOT REMOVE THE AERATOR IF THERE IS ONE, but make a notation that there is an aerator present.**

6. The two small volume samples from each site are to be collected as follows:
   a. Before beginning the sampling process, write on each sample bottle's green label an identification code according to the sample tap coding, and type of sample collected (i.e. KC-P1, KC-P2) using a black Ultra Fine Point Sharpie permanent marker. To ensure clarity for the DEQ lab data coders draw a slash mark through each zero, the number one is a straight vertical line (no hat or foot), and cross each number seven.
   b. Next, using a red Fine Point Sharpie permanent marker, write '1' on the white cap of the sample unit marked as P1; write '2' on the cap of the unit marked as P2.
   c. Complete the Request for Analysis forms for each sample using a pen, pencil or black Sharpie. If the testing parameter is not already populated for Lead and Copper analyses, mark as 32CC for the 125 ml sampling units.

d. Make sure to collect the water samples in this order: "P1" for the very first-draw and "P2" as the second first-draw, adding a prefix for KC- (kitchen cold), BF- (bathroom faucet cold), etc.
e. Place the first bottle under the tap, open the tap to produce a slow, steady "pencil thin" flow and fill the first bottle (P1) to the appropriate level and immediately fill a second bottle (P2) without a break in stream (do not turn off the tap between the first and second bottle and do not allow water to run down the drain in between the first and second bottle).
f. Turn off tap. Cap each sample unit checking to make sure to match P1 unit to '1' white cap, P2 unit to '2' white cap.

7. Secure the appropriate request for water analysis form to the appropriate bottle (refer to the example bottle provided for "instructions") with a rubber band.

8. Bundle the two samples collected at each individual sampling location (after the proper paperwork has been banded to each bottle) and secure the two samples together with a single rubber band.

9. Collect the remainder of the samples from the kitchen faucet under Step 6 (below).

Step 6 – Collect the Large Volume Samples

After all small volume (125 ml) samples have been obtained in the building/home, sampling will begin to collect ten consecutive/sequential 1 liter samples at the kitchen faucet.

At the kitchen faucet location, the procedure to collect ten consecutive/sequential 1 liter samples is as follows:

1. Assemble 10 1-liter 36CC sampling units labeling with a red Fine Point Sharpie marker on the neck or bottle cap to indicate order of collection (example: KC-A1, KC-A2, KC-A3 .... KC-A10.
2. Before beginning the sampling process, write on each sample bottle's green label an identification code according to the sample tap coding, and type of sample collected (i.e. KC-A1, KC-A2) using a black Ultra Fine Point Sharpie permanent marker. To ensure clarity for the DEQ lab data coders draw a slash mark through each zero, the number one is a straight vertical line (no hat or foot), and cross each number seven.
3. Complete the Request for Analysis form for each bottle using test code 36CC.
4. Begin sampling the first 1 liter bottle similar to a first draw sample.
5. Fill ten 1 liter bottles consecutively without letting the water run down the drain.
6. Wrap each request for water analysis form around the appropriate bottle and use a rubber band to secure it.

7. Deliver all sample bottles to the DEQ Drinking Water Laboratory.

Step 7 - Laboratory Performs Analysis

Samples delivered to the DEQ Drinking Water Laboratory will be analyzed in accordance with the Laboratory Services Standard Operating Procedure (SOP) Document SOP #800 Revision #4 Effective Date 10/2015.

Applicable analytical methods will be in accordance with the Method for Determination of Metals in Environmental Samples, Supplement I, U.S. Environmental Protection Agency, Method 200.8, 1999 Revision 5.5.

All Method Detection Limits shall be performed according to Title 40 of the Code of Federal Regulations, Part 136, Guidelines Establishing Testing Procedures for the Analysis of Pollutants, Appendix B, Definition and Procedure for the Determination of the Method Detection Limit.

Analytical quality control will be in accordance with SOP #800 Revision #4.

Adding Phosphate to Flint Water

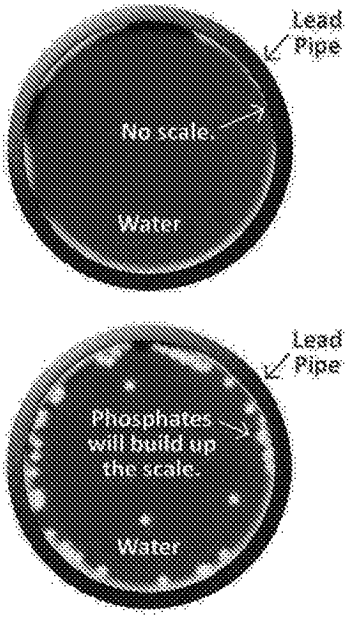
Genesee County Health Department

MDHHS

Why is there lead in some homes' water?

- Lead pipes, solder, and faucets used to be common. We now know that lead can harm our health.
- Homes built before 1987 are more likely to have lead service lines and pipes. Some faucets and certain kinds of solder could also have lead in them, even those installed recently.
- The lead found in tap water in homes around Michigan is likely from these older pipes, solder, and faucets.
- Replacing old pipes, service lines, and faucets is the only sure way to limit the lead in your tap water.
- New pipes and solder should meet EPA lead-free standards.

Why are we putting phosphate in the water?



- Over the years, minerals in our water have built up inside our water pipes.
- This mineral build-up is called scale.
- This scale helps to keep a lot of lead from the pipes out of our water.
- If something happens to the scale and the water can touch the pipes, lead can get into the water.
- Adding phosphate to the water helps build and maintain scale by collecting on the sides of the pipes and sticking to the metal.

Learn About Phosphate

- Phosphorus is a natural mineral that your body needs. It works with calcium to keep your bones strong and healthy.
- Phosphate is a type of salt that has phosphorus in it.
- Although there already is phosphate in the Detroit drinking water, extra phosphate is being added to the water in the City of Flint to help put more scale in the pipes.
- The City of Flint, MDEQ, and the EPA worked together to find how much more phosphate is needed in the water going to Flint homes.
- Most people likely already eat and drink more phosphate in everyday food than the very small amount that will be found in the tap water.
- Continue to use water filters that remove lead until the Genesee County Health Department's Public Health Emergency Declaration is removed.

What is Phosphoric Acid?

Although there is already some phosphate in the water we get from Detroit, Flint plans to add more to help build up and maintain the scale faster. To get the phosphate needed for this to work, the City of Flint Water Plant will be adding something called *phosphoric acid* to the city's water. Phosphoric acid is a common food ingredient in things like cola or juice.

The phosphoric acid will quickly dissolve in the water and break down into two parts - hydrogen and phosphate. Hydrogen will become a part of the water and the leftover phosphate will settle out and stick to the walls of the pipes - building up scale like in the picture above.

If you have questions about the phosphate being added to City of Flint water, please call the City of Flint Water Plant at 810-787-6537.

If you have questions about phosphate and your health, please call MDHHS at 1-800-648-6942.

V.12/03/2015

Flint PbCu sample results 7/1/15 - 12/31/15				
Sample Date	Location	Sample Point	Pb in ppm	Cu in ppm
7/2/2015	212 Browning	refridgerator water line	0	0
7/2/2015	628 Frost St	kitchen	0.009	0.06
7/2/2015	202 Browning	kitchen	0.002	0.07
7/6/2015	625 S. Grand Traverse	utility sink	0.003	0
7/6/2015	2110 Mountain Ave	kitchen	0.006	0.05
7/6/2015	413 Burrough Ave	kitchen	0	0
7/9/2015	2106 Pierce St	kitchen	0.007	0.06
7/9/2015	818 Lyon St	kitchen	0.005	0
7/11/2015	1150 Woodside Dr	kitchen	0.03	0.06
7/13/2015	604 Chalmers St	kitchen	0.002	0.06
7/13/2015	3710 Fox Croft Cr.	kitchen	0.002	0
7/13/2015	2107 Calumet St.	bathroom	0.005	0.08
7/14/2015	341 Robbie Ln	kitchen	0.003	0.14
7/15/2015	2553 Swayze	bathroom	0.006	0.15
7/16/2015	421 Lyon St	kitchen	0.007	0.21
7/17/2015	1509 E. Court St 2	small sink	0.033	0.17
7/17/2015	1509 E. Court St	kitchen	0.003	0.3
7/21/2015	3125 Dakota Ave	kitchen	0.003	0
7/21/2015	3131 Dakota Ave	kitchen	0.002	0
7/22/2015	2909 Brownell Blvd	kitchen	0.007	0.08
7/28/2015	2112 Sherff	kitchen	0.011	0.05
7/31/2015	1311 Woodlawn Pk.	bathroom	0.006	0.37
7/31/2015	3311 Hawthorne Dr.	kitchen	0	0
7/31/2015	1019 E. Fork Dr.	kitchen	0	0.07
8/2/2015	1911 Tuscola	kitchen	0	0.06
8/7/2015	1623 Neome Dr.	bathroom	0.028	0
8/25/2015	2023 Miller Rd.	kitchen	0	0
8/26/2015	1201 Maxine St.	kitchen	0.002	0.08
9/1/2015	2553 Swayze	main bathroom	0.005	0
9/9/2015	1001 Dupont St.	kitchen	0.002	0.05
9/10/2015	914 Maxine St. 1	kitchen	0.004	0
9/10/2015	914 Maxine St. 2	kitchen	0.001	0
9/15/2015	1213 Beard St.	kitchen	0.006	0.07
9/15/2015	4307 Ogema Ave.	kitchen	0	0
9/16/2015	2761 Chicago Blvd.	bathroom	0.001	0
9/16/2015	1422 Clancy	bathroom	0.007	0
9/17/2015	1614 Woodlawn Park Dr.	other	0.02	0.13
9/18/2015	1025 Kensington Ave.	kitchen	0.002	0.07
9/21/2015	2616 Hillcrest	kitchen	0.005	0
9/22/2015	440 E. atherton	kitchen	0.013	0.12
9/22/2015	2801 Yale St.	kitchen	0.327	0.19
9/22/2015	5602 Baldwin Blvd.	kitchen	0.006	0
9/22/2015	1930 Colchester	kitchen	0	0
9/22/2015	NA	NA	0.002	0
9/23/2015	618 E. Sherman	kitchen	0.001	0
9/23/2015	926 Maxine St.	kitchen	0.003	0
9/23/2015	1426 Maplewood Ave.	kitchen	0.01	0.09
9/23/2015	1205 Blanchard	kitchen	0.009	0.07
9/25/2015	841 Dickinson St.	kitchen	0.008	0.15

Sample Date	Location	Sample Point	Pb in ppm	Cu in ppm
9/25/2015	3216 Hawthorne Dr.	bathroom	0.003	0.37
9/25/2015	125 E. Union St/#1	kitchen	0.001	0
9/25/2015	125 E. Union St/#6	kitchen	0.004	0
9/26/2015	401 Burroughs Ave.	kitchen	0.002	0.07
9/27/2015	3513 Bennett Ave.	kitchen	0.002	0.06
9/27/2015	1939 Laurel Oak Dr.	kitchen	0.002	0.15
9/28/2015	704 Garland St.	kitchen	0.002	0.11
9/28/2015	705 Garland St.	kitchen	0.001	0.34
9/28/2015	218 University Ave.	kitchen	0.006	0
9/28/2015	605 Garland St./1	kitchen	0.004	0.16
9/28/2015	605 Garland St./2	Drinking Fountain	0	0.22
9/28/2015	2607 Walter St.	kitchen	0.002	0
9/28/2015	unknown	unknown	0.012	0.15
9/28/2015	224 Fourth St.	kitchen	0.075	0.57
9/28/2015	528 S. Lynch St.	kitchen	0.003	0
9/28/2015	2717 Concord St.	kitchen	0.004	0.12
9/28/2015	2430 Bassett Pl.	bathroom	0.007	0
9/28/2015	1210 Walker St.	kitchen	0.03	0
9/29/2015	2426 Bassett Pl.	kitchen	0.002	0.06
9/29/2015	2422 Bassett Place	kitchen	0	0.14
9/29/2015	3729 Woodrow Ave.	kitchen	0	0
9/29/2015	3617 Churchhill Ave.	kitchen	0	0.05
9/29/2015	418 Wl Pulaski	kitchen	0.001	0
9/29/2015	1126 Woodside Dr.	kitchen	0.006	0.1
9/29/2015	1222 Ingleside Ave.	kitchen	0	0.27
9/29/2015	1308 Walnut	kitchen	0.005	0.05
9/29/2015	2319 Bagley	kitchen	0.041	1.04
9/29/2015	605 Chandler	kitchen	0	0.33
9/30/2015	1206 Willow St.	kitchen	0.003	0
9/30/2015	2708 Crestwood Dr.	kitchen	0.018	0.29
9/30/2015	2708 Crestwood Dr.	kitchen	0.002	0
9/30/2015	2721 Coventry Ct.	kitchen	0.006	0.15
9/30/2015	4214 Kellar Ave.	bathroom	0.002	0
9/30/2015	904 E. 7th St.	kitchen	0.005	0
9/30/2015	927 Kensington Ave #2	kitchen	0.002	0.41
9/30/2015	927 Kensington Ave	bathroom	0.009	0.17
9/30/2015	1210 Kensington	kitchen	0.005	0
9/30/2015	3014 Begole St.	bathroom	0.003	0
9/30/2015	3705 Whittier Ave	kitchen	0.001	0.07
9/30/2015	3120 Norwood Dr.	bathroom	0.011	0
9/30/2015	2207 Hills St.	kitchen	0.003	0.1
10/1/2015	602 W. Stewart	kitchen	0.007	0.2
10/1/2015	1359 Donaldson #2	bathroom	0	0
10/1/2015	1359 Donaldson	kitchen	0	0.08
10/1/2015	612 E. 3rd St. Apt #3	kitchen	0.002	0
10/1/2015	3701 N. Averill Ave.	kitchen	0	0
10/1/2015	819 Kensington	kitchen	0.001	0
10/1/2015	4219 Greenlawn Dr.	kitchen	0.001	0.07
10/1/2015	1329 Washington	kitchen	0.01	0
10/1/2015	533 Macdonald	kitchen	0.001	0
10/1/2015	932 Kensington Ave	kitchen	0.004	0.23

Sample Date	Location	Sample Point	Pb in ppm	Cu in ppm
10/1/2015	G3139 Hogarth Ave #1	Duck Drinking Fountain	0	0.17
10/1/2015	G3139 Hogarth #2	School Drinking Fountain	0.002	0.22
10/1/2015	G3139 Hogarth Ave	kitchen	0	0.07
10/1/2015	1005 Kensington Ave	kitchen	0.001	0.05
10/1/2015	1002 Kensington Ave Apt #1	kitchen	0.003	0
10/1/2015	1006 Kensington Ave	kitchen	0.004	0
10/1/2015	23009 Pierce St. #2	refridgerator	0	0
10/1/2015	2309 Pierce St.	kitchen	0	0
10/1/2015	1319 Beard St.	kitchen	0.007	0.41
10/1/2015	1001 Kensington Ave	kitchen	0	0
10/1/2015	540 S. Saginaw St.	kitchen	0.002	0.92
10/1/2015	736 Waldman	kitchen	0.001	0
total samples as of 10/7/15 = 112			9 over AL	0 over AL
		90th percentile	11.0 ppb	262 ppb

Michigan Department of Community Health

Flint Water Lead Communication Plan

September 9, 2015

Presented by:

MDHHS-DEH Toxicology & Response Section

1st bullet - quality, it to by residents that have lead plumbing, service lines or high lead solder.

Plan Overview

Project: Flint Water Lead

Name of Campaign: To be Determined (e.g. Lead us to Water: Flint Clean Water)

Objective

The Michigan Department of Health & Human Services has a mission to protect, preserve, and promote the health and safety of the people of Michigan with particular attention to providing for the needs of vulnerable and under-served populations. The residents of Flint currently perceive problems related to the usage of the Flint River as their temporary water source until a pipeline is completed which will bring water from Lake Huron. Problems – both substantiated and unsubstantiated included excess TTHM, discolored water, and high levels of lead in tap water. These problems have given rise to a well-organized community group Water You Fighting For (wateryoufightingfor.com) and has gotten the attention of water activists/researchers from Virginia Tech University (flintwaterstudy.org).

Given there is no safe level of lead for young children, a public health outreach campaign to inform the public of the sources of lead in their community is recommended. MDHHS will promote collaboration between the City of Flint, the County Health Department, community members, and other interested parties to halt human exposure of lead through development and proactive delivery of scientifically accurate information delivered in multiple formats at a literacy level that is accessible to all.

Background

Drinking water analytical reports find that the water meets the federal drinking water standards and is safe for public consumption. The aesthetic quality of the water, which may make the water unappealing to drink or use, does not make the water unsafe. Poor aesthetic quality, if true, will be a barrier to conducting an effective public health outreach campaign.

Lead is not found to be elevated in the drinking water at the source; however, citizens have reported high lead levels in their tap water. Sources of lead to the tap water are likely from lead piping or solder in or entering the home. Lead piping and solder are sources that the home-owner needs to know how to address. Additionally, older homes (pre-1978) can have lead containing paint and homes near historic high-traffic areas can have elevated lead levels in soil.

Target Markets

- Citizens of Flint who use Flint City Water
- Citizens of Flint who live in homes built in 1987 or before
- Citizens of Flint who are pregnant or have children living in the home that are 6 or under

Message Summary

- There are personal actions individuals can take to prevent exposure to lead.
- Lead exposure does not just occur through water.
- You can be tested for blood lead levels to determine if you or your children been exposed.
- There are resources available to assist with remediation.

Call to Action

Exposure to lead through pipes, paint, and soil are preventable. There are steps people can take to be proactive in preventing their exposure and potential health issues. MDHHS notes that this problem is also not limited to Flint. This campaign will be created and piloted with the City of Flint, but may be expanded statewide.

Project Plan

Public Meetings –

- Begin with small groups to identify key stakeholders
- Plan larger meeting addressing
    - the lifespan of water from source to treatment center to home
    - how people can identify if their home may be affected
    - what the VTU results really mean
    - what can be done on an individual, city, and state level

e-Toolkits, Social Media & Print Outreach

- Compile existing information on being lead-safe
- Create easily shared infographics – what can be done, what are signs and symptoms
- Create brochures about health effects of lead

Project Timeline

Responsibilities	Target Date	Objective	Tasked to:
TBD	TBD	TBD	TBD

Current Media Review

http://www.washingtontimes.com/news/2015/sep/2/flint-water-is-risky-in-old-homes-researchers-say/

http://www.mlive.com/news/flint/index.ssf/2015/07/marchers_continue_drumbeat_for.html

- great photos

http://www.washingtontimes.com/news/2015/jul/10/activists-rally-about-water-in-flint-after-weeklon/

http://www.deadlinedetroit.com/articles/12697/scary_leaded_water_and_one_flint_family_s_toxic_nightmare#.VfCCoBFVhBc

http://flintwaterstudy.org/about-page/about-us/

http://www.wateryoufightingfor.com/

http://www.mlive.com/news/flint/index.ssf/2015/09/flint_mayoral_challenger_calls.html

http://www.mlive.com/news/flint/index.ssf/2015/09/mayor.html

http://michiganradio.org/post/team-testing-flint-water-lead-sample-sample#stream/0

http://www.mlive.com/news/flint/index.ssf/2015/09/new_testing_shows_flint_water.html

- On Monday, Aug. 31, the researchers reported 42 percent of 120 initial samples from Flint had lead levels that were more than 5 parts per billion, "which suggests a serious lead-in-water problem, according to our experience and criteria."
- The EPA requires water systems like Flint's to collect tap samples from sites that are more likely to have plumbing materials containing lead.
- If more than 10 percent of samples exceed 15 ppb, then water systems are required to take action, including steps to optimize corrosion control treatment.
- "The city of Flint has offered free and independent testing to residents since spring, and I encourage people to use this service if they have questions," Walling's statement said.
- Edwards, a professor of civil and environmental engineering, said the elevated lead levels he has seen in Flint tap water are tied to a corrosive water source that contains about eight times more chloride than Detroit water does.
- "Chloride is generally considered to be very corrosive to iron. For instance, chloride present in road salts applied in the winter causes iron in cars and bridges to rust," the Virginia Tech team's website says.
- "This could be a huge public health problem. ... The Flint water just ate the pipe up," Edwards said of the testing he has overseen so far.
- "If it were me, I would not be using (Flint River water) for cooking or drinking unless I had it tested for lead," said Edwards, who previously mounted a six-year campaign that succeeded in forcing the U.S. Centers for Disease Control and Prevention to admit it had misled the public about the risk of lead in the Washington, D.C., area's drinking water, according to The

Washington Post.

- Since the switch, the city has been plagued by issues such as water main breaks and boil water advisories because of bacteria and has been in violation of the Safe Drinking Water Act because of high levels of total trihalomethanes (TTHM), a byproduct of chlorinating river water.
- The Rev. Allen Overton, who hand-delivered petitions to Walling on Monday, asking that city officials reconnect the Flint water system to Detroit, said Wednesday that the Virginia Tech experiment is more evidence Flint is not using the best quality of water available.
- "We have a major health issue here, (and) they are not being honest with the citizens of Flint," Overton said.

Flint Water Petition:

https://secure3.convio.net/fww/site/Advocacy;jsessionid=7266B35978FAD2EFBD3A57D87D5085AB.app334b?pagename=homepage&page=UserAction&id=2199&autologin=true&s_src=blg&s_subsrc=070915a

Dear [Flint Mayor Dayne Walling and Flint City Council],

Water is a basic human right. The United Nations General Assembly recognizes that access to safe drinking water and sanitation are essential to the realization of all human rights.

In 2014, Flint's emergency manager disconnected the city from the Detroit Water and Sewerage Department (DWSD) and started providing residents with water from the Flint River. Since that time, residents have been struggling to maintain access to a clean, safe drinking water supply.

Residents of Flint report having tap water with high levels of copper, lead, THMs (chemicals that result when chlorine mixes with organic matter), tin, lime and iron. The water is often brown or bluish-green in color and contains sediment. As a result, people are experiencing symptoms including hair loss, lead poisoning and diseases related to consuming high levels of copper (to name a few).

The Flint River clearly is not a safe, reliable source for the city's drinking water. It was as easy as pushing a button to disconnect from DWSD; it's time to push the button again, reconnecting Flint to DWSD and providing Flint residents with the clean, safe water they deserve.

Please reconnect Flint to the Detroit Water and Sewerage Department immediately and make water safe and clean for all.

Sincerely,
[Your Name]
[Your Address]
[City, State ZIP]

Washington DC

https://www.dcwater.com/lead/

- Sources of lead in drinking water

- **Lead service pipe**
  In the U.S., lead service pipes were installed until the mid-1950s. Older properties may still have lead service pipes, which connect the water main in the street to household plumbing. The service pipe is owned by the property owner. Under certain conditions, DC Water is authorized to repair, maintain or renew the portion of the service pipe in public space. The maintenance of the portion of the service pipe on private property is the exclusive responsibility of the property owner. A "partial" lead service pipe replacement is where a portion of the service pipe is replaced, but a portion made of lead remains in public or private space.

  Lead service pipes were installed until the mid-1950s.

- **Lead solder**
  This connects pipes in household plumbing. In 1987, lead solder was banned from use in household plumbing. If your house was built before 1987, your plumbing may have lead solder.

- **Brass faucets, valves or fittings**
  Almost all faucets, valves and fittings have brass components. Until 2014, brass faucets and fittings sold in the U.S. and labeled "lead-free" could contain up to eight percent lead. Effective January 2014, the Reduction of Lead in Drinking Water Act specifies that these materials may not contain more than 0.25 percent lead.

- **Galvanized iron pipes**
  Household galvanized pipes are old, corroded pipes that were installed in many homes before the 1960s. These pipes can release lead in water if the property has, or previously had, a lead service pipe. Galvanized pipes are made with a protective layer of zinc. However, the zinc layer erodes over time and results in corrosion. When lead is released from a lead service pipe and passes through galvanized plumbing (particularly over decades of use), lead can accumulate on the inside, corroded walls of this plumbing.

  Lead release from galvanized pipes can vary from home to home and can continue to occur even after a lead service pipe is replaced. Galvanized pipes can cause other water quality problems, such as low water pressure and discolored water. For additional information on household plumbing, click here.

https://www.sciencenews.org/article/stillbirth-rates-tied-lead-drinking-water

9/11/15.

Kory
Michelle

consumer awareness

campaign needs a dedicated resource/PR funding?

vision for what would the work be?

- analytical interests meets LOWA rgt.
- community is concerned
- coalition building
- information / message

reaching at this point
Michelle - suggests we need to meet

need agreement re: direction
Dan W. ?
Nick L.

- still need to contact owner Corky CHD.
EH Director
interest?
trusted party?

Shekter Smith, Liane (DEQ)

From: Devereaux, Tracy Jo (DEQ)
Sent: Thursday, December 10, 2015 8:38 AM
To: Shekter Smith, Liane (DEQ)
Subject: FW: FOIA 0510-16 SECOND NOTICE

p. 1-8 11/6/15 emailed draft letter dated 12/3/15

fyi

Thanks,
Tracy Jo

p. 9 — ~~ews~~ GCHD instructions

p. 11-12 NCWS 9/13

From: Yanna Lambrinidou [mailto:pnalternatives@yahoo.com]
Sent: Thursday, December 10, 2015 8:18 AM
To: Shaler, Karen (DEQ)
Cc: DEQ-RMD-FOIA; Devereaux, Tracy Jo (DEQ); Looney, Carolyn (DEQ)
Subject: Re: FOIA 0510-16 SECOND NOTICE

Thank you.

I see 4 sampling protocols in the file you sent me (on pages 1-8, 9, 11-12, and 13-14). Can you please send me the dates when these sampling protocols were in use (as well as if they continue to be in use)?

Regards,

Yanna Lambrinidou PhD
Parents for Nontoxic Alternatives
PO Box 6283
Washington DC 20015
P 202.997.1834
B www.dcwasawatch.blogspot.com

From: "Shaler, Karen (DEQ)" <SHALERK@michigan.gov>
To: Yanna Lambrinidou <pnalternatives@yahoo.com>
Cc: DEQ-RMD-FOIA <DEQ-RMD-FOIA@michigan.gov>; "Devereaux, Tracy Jo (DEQ)" <DEVEREAUXT@michigan.gov>; "Looney, Carolyn (DEQ)" <LOONEYC@michigan.gov>
Sent: Tuesday, December 8, 2015 4:58 PM
Subject: RE: FOIA 0510-16 SECOND NOTICE

Ms. Lambrinidou,

We have received payment confirmation from our Cashier's Office, so attached is a PDF of the DEQ's records for FOIA 0510-16.

If you have any questions, please contact us. Thank you.

Karen Shaler
Management Assistant to Chief Deputy Director Jim Sygo
FOIA Liaison, Executive Division
Michigan Department of Environmental Quality
Constitution Hall, 6th Floor South
P.O. Box 30473

Drinking Water Lead & Copper Sampling Instructions

Thank you for helping to monitor for lead and copper in your drinking water. It is important that you follow these instructions so that we may collect an accurate measurement of the lead and copper in your drinking water. This sample is supposed to represent the water you would typically drink and the faucet from where you would drink the water. Call your water supply if you have any questions.

1. Select a faucet in the school that is commonly used for drinking. DO NOT sample from a laundry sink or a hose spigot.

2. The DAY PRIOR to collection, flush the COLD water for at least 5 minutes at the selected faucet. Then let the water sit for at least 6 hours **before** you plan to collect the sample. If you have a single handle faucet, turn it to the COLD side. DO NOT use this faucet again until it is sampled.

3. Wait at least 6 hours before collecting your sample. Collect the sample prior to occupancy the next morning. Stagnation periods longer than 24 hours may not be representative of normal use.

4. Fill the sample bottle to the neck with the "first draw" of COLD water from the faucet that you flushed at least 6 hours previous.

5. Please answer the following questions:

a) Did you flush the water for at least 5 minutes and let it sit unused for 6 hours before you filled the bottle? ☐ Yes ☐ No

b) What date and time did you **flush the faucet?** Date _____ Time _____ P.M.

c) What date and time did you **fill the bottle?** Date _____ Time _____ A.M.

d) Did you fill the bottle from the same faucet that was flushed 6 hours before? ☐ Yes ☐ No
If NO, please explain: _____

e) Which faucet did you use to fill the bottle? ☐ Kitchen ☐ Main Bathroom ☐ Other
If OTHER, please describe: _____

f) Is this faucet connected to a treatment device such as a water softener, a reverse osmosis unit, an iron removal device OR is any kind of additive used in the school? ☐ Yes ☐ No
If YES, please describe: _____

Your Printed Name _____

Your Address _____

_____

Your Signature _____

6. Attach this form to the bottle and contact the individuals listed below for pick-up.

If you have any questions call:		Or contact:	
Local Health Dept.:	Genesee County Health Dept.	Michigan Department of Environmental Quality	
Contact:	Mr. Jim Henry, EH Supervisor	DEQ contact:	Mr. Michael Prysby
Phone:	810-257-3618	Phone:	517-290-8817

Thanks again for your help. We will send you the results once available. Contact the personnel listed above if you have any questions.

Fact Sheet: 6

Lead / Copper Sampling
Nontransient Noncommunity Public Water Supplies

Water Supply Serial Number (WSSN) _____ Well # _____

Name of Water Supply _____

Sampling Contact _____ Phone _____

Health Department Contact _____ Phone _____

Lead/Copper Sampling Frequency: Number of Samples_____taken every _____months.
Sampling Location _____
(Sampling siting plan approved by local health department in sanitary survey)

Laboratory Name _____ Phone _____

Lead/Copper – General Information

Lead is a common metal found throughout the environment in lead-based paint, air, soil, household dust, food and water. It builds up in the body over many years and may result in damage to the brain, red blood cells and kidneys. Lead enters drinking water primarily as a result of corrosion, or wearing away of materials containing lead in the water distribution system. These materials include lead-based solder used to join copper pipes, brass and lead piping. The concentration of lead in drinking water may be a function of numerous factors related to the presence of lead, water chemistry, temperature, pH, system hydraulics, usage, etc., and can vary over time. The presence of copper in drinking water is also primarily a result of corrosion. Acute exposure to copper can result in nausea and diarrhea. The US EPA has established an action level for lead of 0.015 milligrams per liter (mg/l) and 1.3 milligrams per liter (mg/l) for copper, for public water supplies.

SAMPLING PROTOCOL

- Obtain sample containers and analysis from a laboratory certified by the DEQ for lead/copper analysis.
- Collect **first draw** samples. (Water has stood motionless in the piping for at least 6 hours.) Do not sample after weekends, holidays or extended periods of stagnation. **Do not flush the sample tap before sample collection.**
- Collect samples where water is drawn primarily for drinking. Sample drinking fountains or kitchen/break room faucets if they are used routinely to obtain water for consumption. Do not sample from slop sinks, hose bibbs, etc. ones that represent the water distribution system, i.e. one in each building wing or on each floor. Or, you can collect more than the minimum number of samples.

Student and/or Employee Population	Number of Samples Each 6 months	Number of Samples after Reduction*
501 to 3,300	20	10
1 to 500	10	5
<101	5	5

* After 2 six month sets below the action level a reduction to annual testing is allowed

- For large facilities collect at least one sample per building until you get the number of samples required for the population served by the water supply (See Table).
- If you have a only a few buildings, split the samples among them as best you can according to where the water is being consumed.
- If you have fewer drinking water fixtures than the chart requires, sample the ones you have and note on the sample log sheet you have sampled all drinking water fixtures.
- Properly identify the sample location on the lab slip and include the water supply serial number (WSSN) on the lab sample forms to properly identify the samples, otherwise, you may not be credited as having sampled.
- Be sure to request the proper lab analysis or test code for lead/copper and place the forms with the bottles.
- Refrigerate all samples during storage prior to shipment.
- Deliver or mail the samples to the lab as soon as possible.

After Receiving Lead/Copper Test Results

1. Properly record sample results on DEQ sheet following the direction and send a copy to the local health department.
2. Calculate the 90th percentile using the directions on the record sheet, or request the LHD do the calculations to determine the 90th percentile.
3. If you exceed an action level, you must:
   - Notify the local health department within 24 hours or the next business day.
   - Notify the public (consumers) of the **lead** action level exceedance as instructed by the health department and take steps to minimize exposure (shutting off fountain, or flushing) as instructed.
   - Additional actions such as sampling the source water for lead/copper and investigating possible sources of lead in the distribution system should be discussed with the local health department.

Within 6 months of the end of the monitoring period in which the action level was exceeded, the facility will need to submit a proposal to conduct a "treatment study" or install "corrosion control treatment."

- Submit the samples to the laboratory for analysis, and record the results on the sample record log provided by the MDEQ.

- Calculate the 90th percentile using the directions on the log sheet, or submit your sample results to the local health department's noncommunity staff person for calculating the 90th percentile.

- Whether or not you do the calculations of the 90th percentile yourself, you are required to submit the results to the local health department noncommunity staff person.

Action levels of ***0.015 mg/liter (ppm) for lead*** and ***1.3 mg/liter (ppm) for copper*** were established in 1991. If the 90th percentile result exceeds either level, the water supply is required to initiate an investigation by:

- ☐ Contacting the local health department for further instructions
- ☐ Sampling all other drinking water taps not previously sampled
- ☐ Sampling the source water
- ☐ Providing public education on the lead exceedance to the population exposed. A copper exceedance does not require public notice at this time.

Corrective measures for action level exceedances may include replacement of fixtures, piping or service lines. If the contaminant level still cannot be reduced below the action level through implementation of these measures, the water supply will need to conduct a treatment study to investigate whether the installation of corrosion control technology may be necessary.

If you have general questions regarding lead or copper exposure, you may contact the Michigan Department of Environmental Quality in Lansing at 517-284-6542. Upper Peninsula inquiries may be directed to 906-346-8530. The MDEQ also has a website for noncommunity water supplies at:
http://www.michigan.gov/deq/0,1607,7-135-3313_3675_3692—,00.html

If you have questions regarding this regulation or other sampling requirements you may have, you must contact your local health department's noncommunity water supply staff personnel. A list of these personnel can be found at the website mentioned above.

The WSSN assigned to your facility is:_____

State of Michigan Noncommunity program staff may be reached in Lansing at 517-284-6542. Upper Peninsula inquiries may be directed to 906-346-8530.

The Type II Noncommunity Water Supply website address is:
http://www.michigan.gov/deq/0,1607,7-135-3313_3675_3692—,00.html

Office of Drinking Water & Municipal Assistance
Environmental Health Section
Noncommunity & Private Drinking Water Supplies Unit
Phone: 517-284-6542 Fax: 517-241-1328

The Michigan Department of Environmental Quality (MDEQ) will not discriminate against any individual or group on the basis of race, sex, religion, age, national origin, color, marital status, disability, or political beliefs. Questions or concerns should be directed to the Quality of Life Human Resources, PO Box 30473, Lansing, MI 48909.

REV. 09/2013 **EQP5897**

NONCOMMUNITY WATER SUPPLIES

UNDERSTANDING LEAD AND COPPER SAMPLING REQUIREMENTS



DEQ

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

The DEQ Environmental Assistance Center toll free number (800) 662-9278 or DEQ homepage at: www.michigan.gov/deq

In 1974, out of concern for the quality of the water we drink, Congress passed the Safe Drinking Water Act. This Act gave the U.S. Environmental Protection Agency (EPA) responsibility for establishing and enforcing drinking water quality standards nationwide. The Michigan Safe Drinking Water Act (Act 399) was enacted in 1976 and enables the Michigan Department of Environmental Quality (MDEQ) to maintain primacy (state authority) over the drinking water program in our State. This Act regulates both community and noncommunity water supplies.

Noncommunity water supplies (NCWS) are of two different types:

- A **transient** NCWS is one that serves water to 25 or more *different* people each day for at least 60 days out of the year. Examples include restaurants, convenience stores, campgrounds, etc.
- A **nontransient** NCWS serve the *same* 25 people each day for six months of the year, such as a school, factory, office building, etc.

The Safe Drinking Water Act contains language regarding the requirements for nontransient, NCWS' built prior to 1987 to test for **lead** and **copper**. The Federal lead and copper regulations were revised in 1998. These revisions went into effect on April 11, 2000, requiring that ALL NCWS to test for lead and copper. The rule changes have been implemented in Michigan as part of the primacy agreement. The sampling frequency is established below in Table 1:

Student/Employee Population	# Samples/ 6 months	# Samples after Reduction*
501 to 3,300	20	10
101 to 500	10	5
<101	5	5

* After 2 six month sets below the action level a reduction to annual testing is allowed



FREQUENTLY ASKED QUESTIONS

Why be concerned about lead or copper?

Lead is a common metal found throughout the environment in lead-based paint, air, soil, household dust, food and water. *It builds up in the body over many years and may result in damage to the brain, red blood cells and kidneys.* Lead enters drinking water primarily as a result of corrosion, or wearing away of materials containing lead in the water distribution system, such as lead service lines and lead solder. The presence of copper in drinking water is also primarily a result of corrosion. Acute exposure to copper can result in nausea and diarrhea.

I have never had to sample before. Why do I have to now?

The revised rule requires that all of the nontransient NCWS must test for lead and copper. It has been shown that some fixtures, even though they were labeled "lead-free" have released small amounts of lead when exposed to water with corrosive or acidic qualities. Copper is still commonly used in plumbing fixtures and piping, and these water quality factors may cause copper to be released into the drinking water.

I only have two drinking water fountains in my building? Do I still have to take the required number of samples?

If you have fewer drinking water fixtures than the chart requires, sample the ones you have and note on the sample log sheet you have sampled all drinking water fixtures.

We operate a large facility with multiple buildings and numerous drinking water fixtures. How many and where to do we sample from?

Sample the drinking water fixtures in the building up to the chart number based on the population of your facility. For instance, if your building has eight drinking water fixtures, and you are required to take five samples, sample only five of the fixtures. If you have more than the chart number of drinking water fixtures, select ones that represent the water distribution system, i.e. one in each building wing or on each floor. For large facilities collect at least one sample per building until you get the number of samples required in Table 1. Or, you can collect more than the minimum number of samples. If you have only a few buildings, split the samples among them as best you can according to where the water is being consumed.

SAMPLING PROTOCOL

- Obtain sample containers and analysis from a laboratory certified by the MDEQ for lead/copper analysis.

- Collect **FIRST DRAW** samples. (Water has stood motionless in the piping for at 6 hours.) **DO NOT SAMPLE AFTER WEEKENDS, HOLIDAYS OR EXTENDED PERIODS OF STAGNATION. Do not flush the sample tap before sample collection.**

- **Collect samples where water is drawn primarily for drinking. Sample drinking fountains, or kitchen/break room faucets if they are used routinely to obtain water for consumption.** Do not sample from mop sinks, hose bibbs, etc.

City of Flint Drinking Water
Outline prepared by the
Michigan Department of Environmental Quality for the
Flint Water Task Force

I. INTRODUCTION

This document is intended to provide an overview of Michigan's implementation of the Safe Drinking Water Act, 1976 PA 399, as amended (Act 399), with respect to events in the city of Flint (City), Michigan.

II. BACKGROUND

1. How has Flint historically obtained its drinking water?

The water system in the City was organized and built under private ownership in 1883 as the Flint Water Works Company to pump raw water from the Flint River to their consumers. In 1903, the system was converted to a municipally-owned corporation which supplied drinking water to the City. In 1967, the City switched and became a customer of the Detroit Water and Sewerage Department (DWSD) system.

After the switch to DWSD, the City operated their water treatment plant as a standby plant for purposes of reliability in the event of an emergency such as an interruption in service through the single pipeline from DWSD.

During 2009, the water treatment plant was used in an emergency capacity in two instances: June 18 through June 20 and September 10 through September 13. Additionally, as a backup emergency plant, the City was required to operate the plant quarterly to demonstrate the capability to produce safe water in accordance with Act 399 and to keep mechanical equipment (such as valves, rubber seals, etc.) in good working order. Each quarter the plant was test run, samples were taken of both raw water and of finished water (post-filters). Monitoring showed that the WTP was performing as designed. However, as a result of contractual obligations with DWSD, this treated water was not put into the City's distribution system during these test runs, but rather was discharged to the river in accordance with a National Pollutant Discharge Elimination System (NPDES) Permit. The test runs were for demonstration purposes, to keep the plant operational and staff familiar with operation in the event it was needed in an emergency.

2. What State and Federal laws or rules exist to ensure safe drinking water is provided to City residents?

The federal Safe Drinking Water Act (federal SDWA) is the primary law that ensures the quality of Americans' drinking water. Under the federal SDWA, the United States Environmental Protection Agency (USEPA) sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.

The federal SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and

1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. (The federal SDWA does not regulate private wells which serve fewer than 25 individuals.)

Originally, the federal SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

The most direct oversight of water systems is conducted by state drinking water programs. States can apply to the USEPA for "primacy," the authority to implement the federal SDWA within their jurisdictions, if they will adopt standards at least as stringent as the USEPA's and enforce those standards. Michigan adopted the Safe Drinking Water Act in 1976 through Act 399 and has maintained primacy for the program since that time.

3. **What is the USEPA's role as a regulatory agency in implementing the SDWA?**

Federal and state governments share responsibility for administering drinking water programs. Under the federal SDWA, the USEPA is given the responsibility for developing national standards and regulations that apply to the nation's public drinking water systems and enforcing those standards, by working with states.

Michigan's drinking water program is audited annually by the USEPA for compliance with the federal SDWA. Based upon these audits, the USEPA continues to find Michigan's drinking water program to be compliant with the federal SDWA.

4. **What is the Michigan Department of Environmental Quality's (DEQ) role as a regulatory agency in implementing the SDWA?**

The federal SDWA permits states to accept oversight of the drinking water program under an agreement with the USEPA giving states primary enforcement responsibilities (or primacy). In addition to this delegation of federal authority to the states, states also have the power to create additional regulations and programs governing drinking water suppliers through their own legislative and regulatory processes. Michigan has had regulatory authority providing oversight of public water supplies since 1913 (waterworks and sewerage systems Act 98 of 1913).

The DEQ has been granted primary enforcement authority in Michigan for the federal SDWA under the legislative authority of Act 399. As such, the DEQ, Office of Drinking Water and Municipal Assistance (ODWMA) has regulatory oversight for all public water supplies, including approximately 1,425 community water supplies and 10,000 noncommunity water supplies. A community water supply provides year-round service to 15 or more living units or 25 or more residents. A noncommunity water supply has 15 or more service connections or serves 25 or more individuals on an average daily basis for not less than 60 days per year.

The DEQ engages in a variety of activities to help water systems remain in, or return to, compliance. These activities include: conducting surveillance visits at water systems and reviewing their facilities, equipment, and operations; requiring the submission of plans and specifications for waterworks system improvements and issuing construction permits; providing for the training, examination, certification and regulation of persons operating water supplies; helping systems invest in preventive measures; and since 1996, providing financial assistance for system improvements.

5. What is the City's role in implementing the federal SDWA?

State and federal programs develop regulations and perform oversight and compliance activities, but do not treat or deliver water to customers. At the local level, public and private water utilities collect, treat, and deliver drinking water to consumers in compliance with state and federal regulations.

To ensure that drinking water is safe, the federal SDWA sets up multiple barriers against pollution. These barriers include: source water protection, multiple treatment components, distribution system integrity, proper operations oversight, and public information. As a public water system, the City is responsible for ensuring proper design, construction, operations and maintenance, so that contaminants in tap water do not exceed the standards established by law. The City treats the water, and must test their water frequently for specified contaminants and report the results to the DEQ. If a water system is not meeting these standards, it is the water supplier's responsibility to notify its customers.

The federal SDWA recognizes that customers have the right to know what is in their drinking water and where it comes from. The City, like all water suppliers, must notify consumers quickly when there is a serious problem with water quality. Water systems serving the same people year-round must provide annual consumer confidence reports (CCR) on the source and quality of their tap water.

The City submits samples of their water for laboratory testing (monitoring) to verify the water they provide to residents meets all federal and state standards. How often and where samples are taken varies from system to system and from contaminant to contaminant. The DEQ provides an annual monitoring schedule to the City setting forth these requirements.

In addition, the City is required to employ properly, certified water operators that are trained and experienced to operate the treatment and distribution system associated with the City's water system.

III. THE FLINT RIVER – IS IT A SAFE SOURCE OF DRINKING WATER?

In Michigan, we are fortunate to have high quality drinking water sources. Seventy percent of Michigan's population receives its drinking water from surface water sources, the majority of which is withdrawn from the Great Lakes. A handful of public water supplies in Michigan do treat water from inland rivers, lakes or groundwater under the influence of

surface water. All surface water sources and groundwater under the influence of surface water requires significant treatment in order to be safe for consumption. Treatment of surface water is referred to under Act 399 as "complete treatment."

While all surface water sources must receive this higher level of treatment, river sources present a greater challenge than water withdrawn from one of the Great Lakes. River sources are more challenging to treat because of how rapidly water quality may change compared to Great Lakes Sources. Under most circumstances, rivers are also prone to greater fluctuations in temperature, have higher amounts of organic material, greater turbidity (suspended solids), and are more vulnerable to microbiological and viral contamination than Lakes Huron, Erie, Michigan or Superior. It should be noted, that while the water chemistry in the Flint River differs from that in Lake Huron, it can still be treated in accordance with the federal SDWA and Act 399. Many cities across the country rely on similar sources for drinking water. The waterworks industry has the technology to treat wide ranging source waters to provide potable and palatable drinking water, including direct reuse of wastewater. Regardless of source water quality, all public water systems must comply with the same drinking water standards in the finished water.

Also, it is not the source water that reacts with the homeowners plumbing out in the distribution system, but rather the finished water quality that is important. To begin with, neither the Flint River nor the treated water leaving the City's WTP contains lead. In addition, the treatment process employed by the City includes lime softening to reduce the hardness in the river water. Lime softening is not a process that would typically be thought to increase corrosivity of water. The City, however, does practice recarbonation to readjust pH at the end of the softening process. pH levels of finished water leaving the City's WTP averaged 7.7. Water monitoring conducted quarterly at 25 sample sites located throughout the distribution system showed the following:

July – September 2014	average pH = 7.71	range: 7.56 – 7.86
October – December 2014	average pH = 7.88	range: 7.62 – 8.10
January – March 2015	average pH = 7.81	range: 7.60 – 7.99
April – June 2015	average pH = 7.63	range: 7.48 – 7.80

The following data was obtained at the same sampling locations throughout the City's distribution system, but while they were still purchasing water from DWSD before the City switched to the River as a source:

January – March 2014 (DWSD)	average pH = 7.47	range: 7.40 – 7.54
April 2014 (DWSD)	average pH = 7.49	range: 7.42 – 7.59

Note that the pH numbers while the City was treating the Flint River did not differ significantly from those produced by DWSD, and in fact, tended to be slightly higher (less corrosive).

IV. *E. COLI* AND TOTAL COLIFORM BACTERIA VIOLATIONS

1. **What caused the *E.Coli* and total coliform bacteria violations experienced by the City in August and September 2014?**

A number of factors, not one specific cause, likely contributed to the Boil Water Advisories (BWAs) in the City during August and September 2014 triggered by exceedances of bacteria standards in limited areas of the distribution system. While the Flint River has higher levels of natural organic matter than typically found in the Great Lakes, Flint's water treatment plant (WTP) performed well above requirements for removal of organic carbon. In addition, the coliform detections were confined to less than 20 percent of the water system. If treatment had been compromised, detections would have been expected throughout the City rather than in such a limited geographic area.

Instead, the violations seem to have been caused by other factors such as aging infrastructure and unusual weather patterns. The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of unlined cast iron piping. This cast iron pipe is subject to internal corrosion, called tuberculation, which thins and weakens the pipe walls in some areas and causes a buildup of sediment and debris on the pipe walls in other areas. Tuberculation can lead to water quality issues as well as reduced flows and pressures. Tuberculation also encourages the development of biofilms, or layers of bacteria that attach to the rough surfaces of interior pipe walls. Biofilm growth is common in areas where little or no disinfectant residual is maintained, and together with tuberculation, may clog water lines to the point of insufficient water pressure.

The City has also experienced decades of a declining customer base and water use, with vacant homes, commercial businesses and industrial property. Declining water use leads to excess residence time (stagnation) within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and loss of disinfectant residual. While the City has recently seen an infusion of funding for blight removal, contractors completing this work have been known to improperly use fire hydrants, causing hydraulic disturbances that dislodged and suspended settled debris, which may have contributed to the bacterial contamination. These hydraulic disturbances were also believed to be the source of the aesthetic water quality complaints both the city and DEQ were receiving.

The winter of 2013/2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30 percent, saw even greater losses since February of that year due to an increase in cold weather related water main breaks and leaks (400 water main breaks in calendar year 2014, with greater than 50 percent in the winter quarter). The City has also been lacking a formal maintenance program for its more than 7,250 valves, which are critical in limiting the areas impacted during water main repairs. As an example, two valves on the transmission line used to supply the area of the 2014 BWAs were found to be closed during the City's investigation of possible sources, causing much longer residence times, reduced disinfectant residuals, and reduced pressures – all potential avenues for contamination to enter a distribution system.

The BWAs also occurred during the warmest and relatively wet periods of August and September 2014. Warm weather conditions are not only more conducive to bacterial

growth but also degrade disinfectant residuals more quickly. As already explained, longer residence times, biofilms, and tuberculation contribute to disinfectant residual degradation. Warm, wet weather conditions also allow water contaminated with bacteria to accumulate or pond around piping that leaks and breaks.

During the summer of 2014, the city was actively repairing the distribution system (29 water main breaks in June through August 2014). After the switch to the Flint River, it was discovered that there were many broken or closed valves in the distribution system (120 broken valves and 239 valves in an improper position). As the city began correcting this problem they did detect the presence of coliform organisms in the distribution system in the testing conducted as a result of the repairs. This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

2. How were the violations detected? What was the DEQ's response?

Federal SDWA Regulations regarding monitoring and standards for bacteria in water distribution systems are incorporated into Act 399. There are a variety of bacteria, parasites, and viruses which can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, water systems are required to test for total coliform and *E.coli*. Total coliform bacteria often originate from the same sources as many pathogens. Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system indicates a minimal likelihood that pathogens are present. *E.Coli* is itself a pathogen and its detection is considered direct evidence of a health risk.

The BWAs which occurred in the City were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the City collaboratively in consultation with the DEQ.

Once a BWA has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Using the most common analytical method, samples must be incubated for 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a BWA. Adding each of these steps together, a normal response period to rescind a BWA under these circumstances would be expected to take 3 to 4 days.

Upon receiving information indicating total coliform and *E. Coli* bacteria had been detected, DEQ advised the City to issue a BWA from August 15 through 20, 2014, for the affected portion of the City. Another BWA was issued from September 5 through 9, 2014, due to localized detections of total coliform bacteria in the same and adjacent portions of the City. The advisory covered an area approximately 6 square miles or less than 20 percent of the water department's service area of just over 34 square miles.

No total coliform or *E. Coli* bacteria detections have been reported in the City since September 2014.

V. TOTAL TRIHALOMETHANES (TTHM) VIOLATIONS

1. What caused the TTHM violations experienced by the City beginning in late summer 2014?

Disinfectants are an essential element of drinking water treatment because of the barrier they provide against waterborne disease-causing microorganisms. However, disinfection byproducts (DBPs) form when disinfectants used to treat drinking water react with naturally occurring materials in the water (e.g., decomposing plant material).

TTHM (chloroform, bromoform, bromodichloromethane, and dibromochloromethane) and halogenated acetic acids (HAA5 – monochloro-, dichloro-, trichloro-, monobromo-, dibromo-) are widely occurring classes of DBPs. The amount of TTHM and HAA5 in driking water from one water system can change from day to day, depending on the season, water temperature, amount of chlorine added, the amount of plant material in the water, and a variety of other factors. All community water systems that chemically disinfect or purchase water that has been chemically disinfected are required to monitor for DBPs.

The Flint River has higher levels of organic material than water in the Great Lakes and as a result the water produced by the City developed higher disinfection byproducts than the water provided by DWSD. However, because the WTP was previously operating intermittently as an emergency backup supply with water being wasted rather than entering the distribution system, it was not possible to predict disinfection byproduct formation until the City began relying on it continuously.

2. How were the violations detected? What was the DEQ's response?

In preparing to rely on the Flint River, the City installed an ozone treatment system to help reduce the organic material (known as precursors), but additional measures were necessary. Because TTHM and HAA5 maximum contaminant levels (MCLs) are calculated based on a running annual average at specific distribution system locations, the actual violation of the federal SDWA standard did not occur until the fall of 2014. However, it was apparent in the summer of 2014 that the standard would eventually be exceeded; the DEQ asked the City to proactively implement measures to address the problem before the violation required them to do so. In addition to operational changes to minimize residence time in the distribution system, the City added granular activated carbon to their filters after receiving a construction permit from the DEQ on July 14, 2015. Levels of TTHMs and HAA5s were reduced and the City returned to compliance with the running annual average (MCL) on September 1, 2015.

VI. THE TASTE, ODOR, AND ~~SMELL~~ COMPLAINTS RECEIVED BY FLINT

1. What caused the taste and odor complaints received by the City from residents?

Taste and odor issues are very personalized. ~~Some water systems receive complaints because of too much disinfectant.~~ In the City, during the summer after the switch to the Flint River as a water source, taste and odor complaints increased. At the time, increases in odor and changes in taste appear to occur because of changes in hydraulic conditions within the distribution system. Water leaving the WTP did not have any unusual odor or color. However, construction in the distribution system, hydrant flushing, and changes in flow characteristics are all known causes of disturbances with the distribution system that can cause an increase in taste and odor. Aesthetic taste and odor, while a concern, alone are not a threat to public health.

2. What was the DEQ's response?

The DEQ consulted with the City regarding these complaints. The City indicated that they were offering testing for anyone that had issues and that they were not able to verify the complaints. Jugs of discolored water were being brought to meetings, but City personnel informed the DEQ that they were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHMs, it was anticipated that there would be short term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) often causes temporary problems as described. Based on information from City personnel, it appeared that the complaints were related to such operational activities occurring in the distribution system.

VII. ~~THE~~ LEAD ISSUES IN THE FLINT DRINKING WATER

1. What causes lead in drinking water?

Lead is rarely found in source water. Lead enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead fixtures, and solder. Older homes built prior to World War II, are more likely to contain lead pipes. The most common problem with newer construction is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially hot water. The amount of lead in tap water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the pH of the water, and its temperature.

2. Are there any safe levels of lead?

The federal SDWA requires the USEPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. These non-enforceable health goals, based solely on possible health risks are called MCLG. The MCLG for lead is zero. The USEPA has set this level based on the best available science which shows there is no safe level of exposure to lead.

3. What is the Lead and Copper Rule?

Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. On June 7, 1991, the USEPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR).

The treatment technique for the rule requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 15 ppb or copper concentrations exceed an action level of 1.3 parts per million (ppm) in more than 10 percent of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the AL for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control. the water system

4. What are the lead action levels (ALs)? maximum contaminant level

For most contaminants, the USEPA sets an enforceable regulation called an MCL based on the MCL Goal (MCLG). MCLs are set as close to the MCLGs as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants at the WTP using suitable treatment technologies. However, because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, the USEPA established a treatment technique rather than an MCL for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to control a contaminant. The treatment technique regulation for lead (referred to as the Lead and Copper Rule) requires water systems that produce drinking water to control the corrosivity of the water. The regulation also requires systems to collect customer tap samples from sites served by the system that are more likely to have plumbing materials containing lead. If more than 10 percent of a system's tap water samples exceed the lead AL of 15 parts per billion (ppb), then water systems are required to take additional actions including:

•Taking further steps to optimize their corrosion control treatment (for water systems serving 50,000 people that have not fully optimized their corrosion control). Fuel?

•Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.

•Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

5. Did DWSD have a corrosion control plan?

After the LCR passed in 1991, DWSD and all of their consecutive customer systems conducted two rounds of monitoring for lead and copper. Copper levels were well below AL limits; but lead levels exceeded the AL of 15 ppb in Detroit and many of their customer communities. As a result, DWSD installed corrosion control treatment. DWSD performed a corrosion control study and concluded that they could reduce the corrosivity of the water by the addition of an orthophosphate.

6. Did the DEQ require the City to have a corrosion control plan in place when it switched to the Flint River as its source of drinking water?

No. There are two ways under the LCR to deem a water supply as providing "optimal corrosion control" – either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment if it is needed. The DEQ requested that the City perform two 6-month rounds of monitoring to demonstrate if the City was practicing optimal corrosion control treatment. According to state regulations (R325.604f (2) (iii), a system can demonstrate that it is "practicing optimal corrosion control" by sampling in two, consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the Flint River has 0 ppb lead, the City would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods.

In addition, the City had been purchasing water from DWSD that was treated for corrosion control. It was DWSD that was considered as having optimized corrosion control at that point. Since the City had not been the supplier of water before, the DEQ did not require the City to "maintain" corrosion control for which it was not responsible. It could not "maintain" operations undertaken elsewhere by a different entity for a different source of water. The DEQ's instructions to the City were consistent with its past practices and its belief that the City should have been afforded the same opportunity that all other large water systems were initially granted to demonstrate optimal corrosion control treatment through full-scale monitoring under the applicable rules. For these reasons, two 6-month rounds of monitoring, as required by the LCR were the required means to determine whether or not optimal corrosion control was being achieved.

7. How does the DEQ calculate the 90th percentile?

To determine the 90th percentile of a list of lead or copper results, the procedure below is followed:

Step 1: Place lead or copper results in ascending order
Step 2: Assign each sample a number, 1 for lowest value
Step 3: Multiply the total number of samples by 0.9 – this yields the 90th percentile sample. For example: 20 samples x 0.9 = 18th sample. This is the 90th percentile level.

Calculating the 90th percentile is easiest when a supply collects 10 samples (or a multiple of 10). ~~Multiples of 10 require~~ no averaging or interpolation. The 90th percentile must be interpolated if the number of samples is not a multiple of 10.

8. What was the result of the first round of monitoring conducted by the City?

The first 6-month round of lead and copper monitoring conducted by the City ended on December 31, 2014. One hundred samples were submitted and the 90th percentile lead level was calculated to be 6 ppb.

A 90th percentile lead result of 6 ppb is not unusual and did not approach the AL or cause alarm. Many water supplies in Michigan and across the country have 90th percentile levels of lead greater than this. Even systems that have installed treatment and are considered optimized by definition can and do have levels between 5 ppb and 15 ppb. For example, in 2014, the following communities had lead results as indicated: DWSD (2.3 ppb), Grand Rapids (2.2 ppb), Kalamazoo (13 ppb), Lansing Board of Water and Light (7.8 ppb), and Saginaw (8 ppb).

9. What was the result of the second round of monitoring conducted by Flint?

The second 6-month round of lead and copper monitoring conducted by the City ended on June 30, 2015. Sixty-nine samples that complied with the site selection criteria submitted and the 90th percentile lead level was calculated to be 11 ppb. The conclusion from these results was that the City, while in compliance with the AL, exceeded the level required to be deemed as having optimized corrosion control.

10. Why was the City required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of Act 399.

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples the City was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census, which listed the City's population as more 100,000 residents. In March of 2015, the City provided updated information that indicated the City's population had decreased to less than 100,000. Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

11. What actions did the DEQ order the City to undertake after the second round of monitoring?

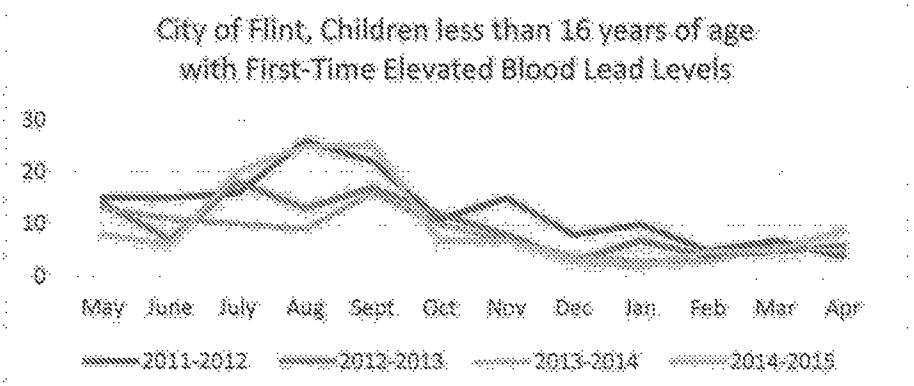
While the City's LCR compliance monitoring continued to meet AL requirements, the City exceeded the level required to be deemed as having optimized corrosion control. Following receipt of the City's compliance monitoring results, the DEQ required the City to install corrosion control treatment in correspondence dated August 17, 2015.

Under the LCR, the City has 6 months to let the DEQ know whether it intends to conduct a study, then 18 months to perform the study and make their recommendation, and 24 months to complete installation of the selected corrosion control. The DEQ requested the City to accelerate this schedule. The City submitted plans and specifications to install corrosion control treatment and a construction permit was issued by the DEQ on October 28, 2015. The City is in the process of installing the necessary equipment and procuring the appropriate chemicals. Treatment is expected to be on-line by the end of November 2015.

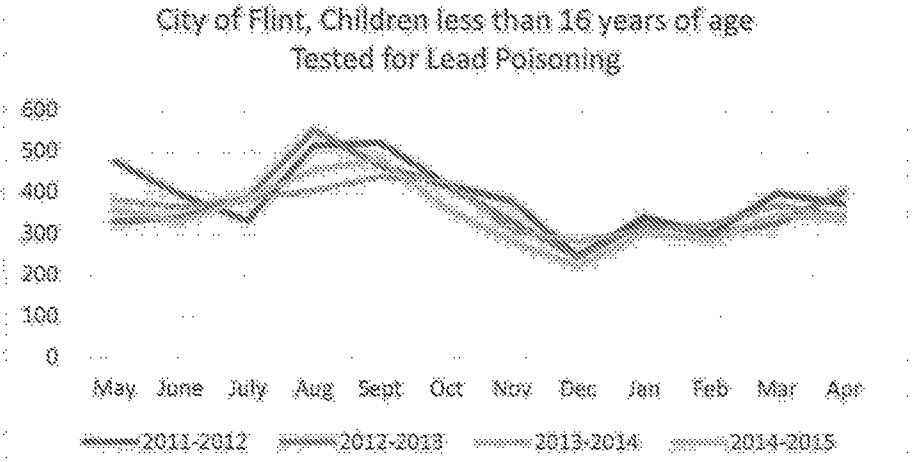
12. What had Department of Health and Human Services (DHHS) advised the DEQ regarding blood lead levels prior to the DEQ ordering the City to implement optimized corrosion control?

In an e-mail dated July 28, 2015, DHHS indicated that they "compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –

- Lead testing rates remained about the same from year-to-year (chart on the right).



- There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).



- However, that pattern was not terribly different from what we saw in the previous three years; especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).

- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspected that the summer data spike may be related to this effect.

- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015."

This e-mail from DHHS in concert with the completion of two 6-month rounds of lead compliance sampling data indicating that the City had not exceeded an AL for lead provided the basis for the DEQ to maintain that the water in the City continued to be in compliance with the federal SDWA and was safe for consumption.

13. When did the DEQ first become aware of allegations of elevated blood levels being detected in certain children?

The DEQ was notified on August 23, 2015, by a professor from Virginia Tech that "over the next few months we will be studying Flint water quality issues..." and similarly notified by the USEPA on August 28, 2015. Results indicating elevated lead levels in homes were reported as part of this study in late August. In early September 2015, information was reported in news articles that pediatricians in the City had data suggesting an increase in children's blood lead levels in two zip codes in the Flint area.

By this time, the City had already completed the required two 6-month rounds of monitoring and a determination had been made by the DEQ that the City must install corrosion control treatment as documented in correspondence dated August 17, 2015.

VIII. QUESTIONS RAISED REGARDING THE DEQ'S ACTIONS

1. What was the DEQ's response to the USEPA's inquiry in February 2015 regarding the optimized corrosion control treatment being implemented by the City under the LCR?

The DEQ indicated that the City was in compliance with the LCR. 90th percentile levels were below the AL of 15 ppb and not unusual when compared to other large Michigan cities. The City was already conducting the second round of monitoring which would provide for a determination of whether additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the LCR that lead results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile AL in the LCR.

2. Did the DEQ attempt to mislead the USEPA in a February 27, 2015, e-mail responding to the USEPA's inquiry regarding Optimal Corrosion Control Treatment (OCCT)?

No. There is an e-mail from Steve Busch indicating that the City was practicing a corrosion control program. What was meant was that the City was performing the required monitoring to determine whether or not they were "practicing optimal corrosion control". The DEQ subsequently clarified its position in follow-up telephone conversations with the USEPA.

3. Has the USEPA subsequently admitted that the LCR is subject to differing interpretations such as that presented by the DEQ?

Yes. On November 3, 2015, the USEPA issued a Memorandum to all 50 states regarding the "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems". This memorandum addresses concerns raised about the application of the LCR, specifically the requirements pertaining to maintenance of OCCT, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. The USEPA states that this type of situation rarely arises, that the language of the LCR does not specifically discuss such circumstances, and that there are differing possible interpretations of the LCR with respect to how the rule's OCCT procedures apply to this situation. The memo is intended to clarify prospectively steps agencies should take or apply in the future. By admitting that the LCR is subject to differing interpretations, the DEQ believes its interpretation and application of the LCR has been validated.

4. Did the DEQ reject any of the samples submitted by the City?

Yes, samples at two locations were excluded from the compliance calculation in conformance with rules issued by the USEPA.

According to the LCR, compliance samples must be a first draw, 1-liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted high-risk sampling sites, called Tier 1 sampling sites. For a municipality such as the City, the Tier 1 sampling pool must consist of single family structures that are:

- served by a lead service line,
- contain lead pipes, or
- contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

As long as a community has Tier 1 sites that contain lead services, they are required to collect at least 50 percent of their compliance samples from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters, etc.

One of the samples submitted by the City was excluded from the 90th percentile compliance calculation in the latest monitoring period because it was taken from a tap at a non-residential site. The other sample result that was removed was collected from a single family home that has a whole house treatment system. Both of these sites are, therefore, excluded from the compliance consideration based upon federal rules. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point-of-use or point-of-entry treatment can only be used if the community has insufficient Tier 1 sites available.

5. **Did the DEQ review the information submitted by the City to ensure all samples were from Tier 1 sites?**

Yes. The DEQ examined the information submitted and certified by the City that their LCR sampling pool consisted entirely of lead service lines from single-family homes, which met the requirements of this rule to maximize sampling of high-risk targeted sites.

During the initial implementation of the LCR approximately 25 years ago, water supplies were required to complete a materials evaluation of their distribution system to identify a pool of targeted, high-risk sampling sites. These sites were to be categorized into one of three tiers (I, II or III) based on risk. The DEQ created an LCR reporting template for water systems to identify each compliance sampling site by Tier, and if they are in the highest Tier (1), to indicate why these sites qualify by having a lead service line, or because they either have copper piping installed with high lead content solder or they have lead plumbing in the home.

If a water system has sufficient Tier 1 sites, they are required to sample them before using any lower Tier sites. Furthermore, if they have sufficient sampling sites with lead service lines, they are required to use them to make up at least 50 percent of their sampling pool each monitoring period. Water supplies are also required to use the same sampling sites each time or explain on their LCR reporting form why they were unable to do so. Finally, we require the water system to certify all of the information they provide on the LCR reporting form is factual.

The DEQ must rely upon the public water system to identify appropriate sampling sites for LCR monitoring. The DEQ public water supply program has no control or authority over service lines or domestic plumbing. As a result, we have no records on construction standards or materials used by customers for these components. If these records exist, they are kept locally where they are reviewed and approved by local agencies such as building departments or plumbing inspectors.

In 2015, City employees again certified that the information submitted on their LCR monitoring reports for the two 6-month rounds of monitoring conducted after they began treating the Flint River were accurate, and DEQ staff review of that information indicated it was in compliance with the monitoring requirements. It was not until October 2015 when the DEQ heard City employees revealing to the media that they did not know for certain if their compliance monitoring was collected from homes with lead service lines. As a result, the DEQ began to investigate their monitoring sites. As the City began to transfer their

customer information to electronic records, the DEQ determined from the information available that a significant number of these sites that had been listed as having lead service lines either did not have them or the information was unavailable. On November 9, 2015, the DEQ notified the City in writing that it would be necessary to conduct a complete assessment of their sampling pool and report back their findings within a month. The DEQ is now awaiting the City's report.

6. Did the DEQ believe the levels of lead found at 212 Browning in April 2015 were indicative of a system-wide problem?

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The City replaced the lead service line May 6, 2015. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem, and subsequent sampling taken at this address showed that replacement of the service line did mitigate the problem. There was, therefore, also no reason to believe that this was indicative of a system-wide problem.

7. Do the DEQ's sampling instructions comply with the LCR?

We continue to disagree with the USEPA on sampling protocols. We have attempted to ensure compliance with the USEPA's guidance provided in the preamble to their lead and copper regulations that said that household use should be "typical" for a residential customer on the day before sample collection for lead and copper. Early in the implementation of the LCR, we had encountered too many situations where compliance samples had been collected from kitchen and bathroom taps that had not been used in days and in some cases, even weeks, resulting in excessively stagnated water and correspondingly high lead levels that did not represent typical exposure expected after overnight stagnation. To incorporate these results into further regulatory decision making could have led to actions that were not indicative of a true public health threat. Further complicating this issue was the USEPA's direct implementation of the LCR in Washington, D.C., where it was learned that some "valid" lead results were not always being included in compliance calculations. Subsequently, the USEPA made invalidation of samples for any reason much more difficult. In order to ensure samples were taken at customer taps representative of typical use, we devised our current recommendations for ensuring appropriate but not excessive stagnation for LCR monitoring.

We continue to believe it is appropriate to flush these taps the day before sample collection to simulate and/or ensure typical household use before the tap is allowed to sit overnight to achieve the expected stagnation time (the regulation recommends a minimum 6 hours stagnation prior to collecting the first draw sample). The LCR does not say the result should represent the "absolute worst case" condition – it talks about sampling the highest risk locations (lead plumbing, lead service lines, high lead content solder piping, etc.) after overnight stagnation and then collecting a first draw sample so as not to flush elevated lead from that tap at that point in time. Until the USEPA changes this rule, we are satisfied with our sampling protocol.

8. Does the DEQ require the use of small-neck bottles to obtain samples?

No. The DEQ does not mandate the use of small-neck bottles; it is the sampling method that is specified in both the federal SDWA and Act 399. Each certified drinking water laboratory provides bottles to their customers upon request for any particular analysis. The bottles provided by the DEQ Drinking Water Laboratory for a lead and copper corrosion control sample do happen to have a small cap opening.

9. Why did the DEQ admit mistakes and apologize?

The mounting Freedom of Information Act Requests brought to the director's attention, information from within the DEQ that was not previously known to Director Dan Wyant– specifically, that the USEPA field staff had raised the question of corrosion control in the spring of 2015 and had been critical of the DEQ's protocol and testing process. It seemed clear that the USEPA field staff had opined that DEQ staff had employed the incorrect protocol. In the face of that new information, Direct Wyant felt compelled to acknowledge that an error may have been made as part of moving the conversation and the situation forward.

The subsequent acknowledgement by the USEPA's regional and headquarters leadership that the LCR speaks ambiguously on the issue of continued corrosion control, and that the DEQ did not employ a protocol that was 'wrong,' was of considerable consolation to the DEQ staff but only left agency leadership feeling more resolute that the LCR needs to be changed, and the DEQ is interested in being part of that process.

Also, there should not have been any disrespect or discredit for those who raised the lead in water issue in Flint. For a tone that did not recognize the seriousness or the issue, Director Wyant did apologize.

9. To which mistake did the DEQ Department Director refer to regarding DEQ's actions on October 18, 2015?

There is ambiguity about how the federal Lead and Copper Rule applies to the situation in Flint.. Upon immediate analysis, it appeared that the DEQ may not have followed the appropriate protocol specified in the LCR for corrosion control treatment for cities with populations of greater than 50,000. Upon further review of the LCR, on November 3, 2015, the US EPA issued updated guidance on the appropriate optimal corrosion control treatment for large water systems switching from purchased treated water to a new source, acknowledging that there were "differing possible interpretations" of the LCR for this circumstance. The DEQ Director respects those voices that raised the issue of lead exposure in Flint and apologizes to those who may have believed that the DEQ's tone discredited their concerns. The DEQ will actively pursue clarifying amendments to the LCR to prevent such situations in other cities.

V. E.Coli and Total Coliform bacteria violations

1. What caused the E.Coli and Total Coliform bacteria violations experienced by Flint in August-September 2014?

A number of factors, not one specific cause, likely contributed to the Boil Water Advisories (BWA's) in the City of Flint during August and September 2014. While the Flint River has higher levels of natural organic matter than typically found in the Great Lakes, Flint's water treatment plant (WTP) performed well above requirements for removal of organic carbon. In addition, the coliform detections were confined to less than 20% of the water system. If treatment had been compromised, detections would been expected throughout the city rather than in such a limited geographic area.

The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of unlined, cast iron piping. This cast iron pipe is subject to internal corrosion, called tuberculation, which thins and weakens the pipe walls in some areas and causes a buildup of sediment and debris on the pipe walls in other areas. Tuberculation can lead to water quality issues as well as reduced flows and pressures. Tuberculation also encourages the development of biofilms, or layers of bacteria that attach to the rough surfaces of interior pipe walls. Biofilm growth is common in areas where little or no disinfectant residual is maintained, and together with tuberculation, may clog water lines to the point of insufficient water pressure.

The City has also experienced decades of a declining customer base and water use, with vacant homes, commercial businesses and industrial property. Declining water use leads to excess residence time (stagnation) within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and loss of disinfectant residual. While the City has recently seen an infusion of funding for blight removal, contractors completing this work have been improperly using fire hydrants, causing hydraulic disturbances that dislodged and suspended settled debris, which may have contributed to the bacterial contamination. These hydraulic disturbances were also believed to be the source of the aesthetic water quality complaints both the city and DEQ were receiving.

The winter of 2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30%, saw even greater losses since February of that year due to an increase in cold weather related water main breaks and leaks. The City has also been lacking a formal maintenance program for its more than 7,250 valves, which are critical in limiting the areas impacted during water main repairs. As an example, two valves on the transmission line used to supply the area of the 2014 BWAs were found to be closed during the City's investigation of possible sources, causing much longer residence times, reduced disinfectant residuals, and reduced pressures – all potential avenues for contamination to enter a distribution system.

The BWA's also occurred during the warmest, and for 2014, relatively wet periods of August and September. Warm weather conditions are not only more conducive to bacterial growth but also degrade the disinfectant residuals more quickly. As already explained, longer residence times, biofilms, and tuberculation contribute to disinfectant residual degradation. Warm, wet weather conditions also allow water contaminated with bacteria to accumulate or pond around piping that leaks or breaks.

During the summer of 2014, the city was actively repairing the distribution system. After the switch to the Flint River, it was discovered that there were many broken or closed valves in the distribution system. As the city began correcting this problem they did detect the presence of coliform organisms in the distribution system in the testing conducting as a result of the repairs. This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and

localized pressure losses. ~~For this reason, precautionary BWAs are often issued when communities lose pressure in all or a portion of their system without first sampling to determine if contamination has entered the system.~~

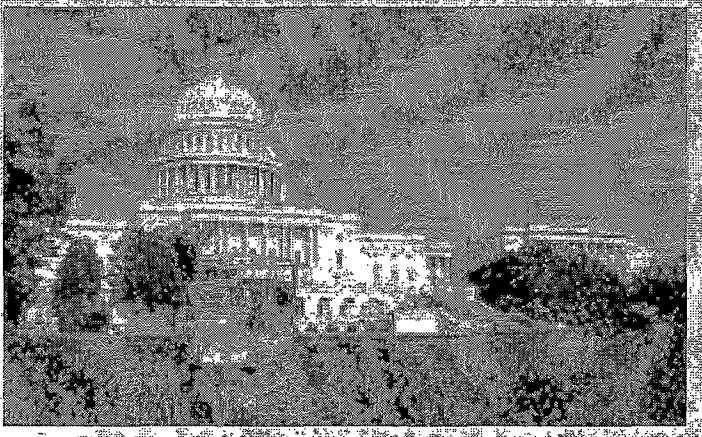
Understanding the Safe Drinking Water Act

SAFE DRINKING WATER ACT • 1974-2004 • PROTECT OUR HEALTH FROM SOURCE TO TAP

The Safe Drinking Water Act (SDWA) was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply.

The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources—rivers, lakes, reservoirs, springs, and ground water wells. (SDWA does not regulate private wells which serve fewer than 25 individuals.)

SDWA authorizes the United States Environmental Protection Agency (US EPA) to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. US EPA, states, and water systems then work together to make sure that these standards are met.



Millions of Americans receive high quality drinking water every day from their public water systems, (which may be publicly or privately owned). Nonetheless, drinking water safety cannot be taken for granted.

There are a number of threats to drinking water: improperly disposed of chemicals; animal wastes; pesticides; human threats; wastes injected underground; and naturally-occurring substances can all contaminate drinking water.

Likewise, drinking water that is not properly treated or disinfected, or which travels through an improperly maintained distribution system, may also pose a health risk.

Originally, SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

All public water systems must have at least 15 service connections or serve at least 25 people per day for 60 days of the year.

Drinking water standards apply to water systems differently based on their type and size.

Community Water System (there are approximately 54,000) - A public water system that serves the same people year-round. Most residences including homes, apartments, and condominiums in cities, small towns, and mobile home parks are served by Community Water Systems.

Non-Community Water System - A public water system that serves the public but does not serve the same people year-round. There are two types of non-community systems:

Non-Transient Non-Community Water System (there are approximately 20,000) - A noncommunity water system that serves the same people more than six months per year, but not year-round, for example, a school with its own water supply is considered a non-transient system.

Transient non-community water system (there are approximately 89,000) - A non-community water system that serves the public but not the same individuals for more than six months, for example, a rest area or campground may be considered a transient water system.

1996 SDWA Amendment Highlights:

Consumer Confidence Reports All community water systems must prepare and distribute annual reports about the water they provide, including information on detected contaminants, possible health effects, and the water's source.

Cost-Benefit Analysis US EPA must conduct a thorough cost-benefit analysis for every new standard to determine whether the benefits of a drinking water standard justify the costs.

Drinking Water State Revolving Fund States can use this fund to help water systems make infrastructure or management improvements or to help systems assess and protect their source water.

Microbial Contaminants and Disinfection Byproducts US EPA is required to strengthen protection for microbial contaminants, including Cryptosporidium, while strengthening control over the byproducts of chemical disinfection. The Stage 1 Disinfectants and Disinfection Byproducts Rule and the Interim Enhanced Surface Water Treatment Rule together address these risks.

Operator Certification Water system operators must be certified to ensure that systems are operated safely. US EPA issued guidelines in February 1999 specifying minimum standards for the certification and recertification of the operators of community and non-transient, noncommunity water systems. These guidelines apply to state Operator Certification Programs. All states are currently implementing EPA-approved operator certification programs.

Public Information & Consultation SDWA emphasizes that consumers have a right to know what is in their drinking water, where it comes from, how it is treated, and how to help protect it. US EPA distributes public information materials (through its Safe Drinking Water Hotline, Safewater web site, and Water Resource Center) and holds public meetings, working with states, tribes, water systems, and environmental and civic groups to encourage public involvement.

Small Water Systems Small water systems are given special consideration and resources under SDWA, to make sure they have the managerial, financial, and technical ability to comply with drinking water standards.

Source Water Assessment Programs Every state must conduct an assessment of its sources of drinking water (rivers, lakes, reservoirs, springs, and ground water wells) to identify significant potential sources of contamination and to determine how susceptible the sources are to these threats.

Roles and Responsibilities:

SDWA applies to every public water system in the United States. There are currently more than 170,000 public water systems providing water to almost all Americans at some time in their lives. The responsibility for making sure these public water systems provide safe drinking water is divided among US EPA, states, tribes, water systems, and the public. SDWA provides a framework in which these parties work together to protect this valuable resource.

US EPA sets national standards for drinking water based on sound science to protect against health risks, considering available technology and costs. These National Primary Drinking Water Regulations set enforceable maximum contaminant levels for particular contaminants in drinking water or required ways to treat water to remove contaminants. Each standard also includes requirements for water systems to test for contaminants in the water to make sure standards are achieved. In addition to setting these standards, US EPA provides guidance, assistance, and public information about drinking water, collects drinking water data, and oversees state drinking water programs.



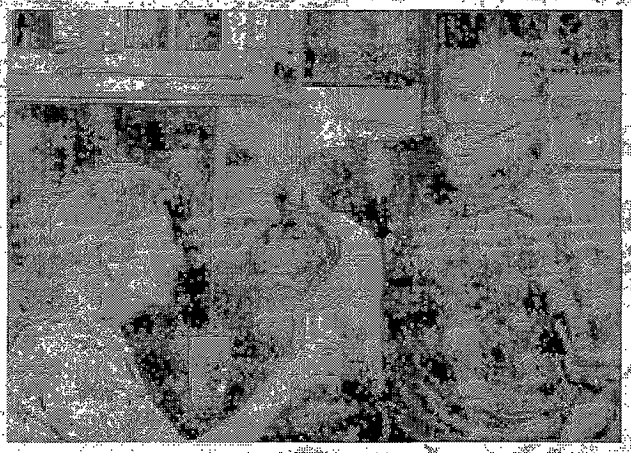
The most direct oversight of water systems is conducted by state drinking water programs. States can apply to US EPA for "primacy," the authority to implement SDWA within their jurisdictions, if they can show that they will adopt standards at least as stringent as US EPA's and make sure water systems meet these standards. All states and territories, except Wyoming and the District of Columbia, have received primacy. While no Indian tribe has yet applied for and received primacy, four tribes currently receive "treatment as a state" status, and are eligible for

primacy. States, or US EPA acting as a primacy agent, make sure water systems test for contaminants, review plans for water system improvements, conduct on-site inspections and sanitary surveys, provide training and technical assistance, and take action against water systems not meeting standards.

To ensure that drinking water is safe, SDWA sets up multiple barriers against pollution. These barriers include: source water protection, treatment, distribution system integrity, and public information. Public water systems are responsible for ensuring that contaminants in tap water do not exceed the standards. Water systems treat the water, and must test their water frequently for specified contaminants and report the results to states. If a water system is not meeting these standards, it is the water supplier's responsibility to notify its customers. Many water suppliers now are also required to prepare annual reports for their customers. The public is responsible for helping local water suppliers to set priorities, make decisions on funding and system improvements, and establish programs to protect drinking water sources. Water systems across the nation rely on citizen advisory committees, rate boards, volunteers, and civic leaders to actively protect this resource in every community in America.

Protection & Prevention:

Essential components of safe drinking water include protection and prevention. States and water suppliers must conduct assessments of water sources to see where they may be vulnerable to contamination. Water systems may also voluntarily adopt programs to protect their watershed or wellhead, and states can use legal authorities from other laws to prevent pollution. SDWA mandates that states have programs to certify water system operators and make sure that new water systems have the technical, financial, and managerial capacity to provide safe drinking water. SDWA also sets a framework for the Underground Injection Control (UIC) program to control the injection of wastes into ground water. US EPA and states implement the UIC program, which sets standards for safe waste injection practices and bans certain types of injection altogether. All of these programs help prevent the contamination of drinking water.



US EPA sets primary drinking water standards through a three-step process:

First, US EPA identifies contaminants that may adversely affect public health and occur in drinking water with a frequency and at levels that pose a threat to public health. US EPA identifies these contaminants for further study, and determines contaminants to potentially regulate. Second, US EPA determines a maximum contaminant level goal for contaminants it decides to regulate. This goal is the level of a contaminant in drinking water below which there's no known or expected risk to health. These goals allow for a margin of safety. Third, US EPA specifies a maximum contaminant level, the maximum permissible level of a contaminant in drinking water which is delivered to any user of a public water system. These levels are enforceable standards, and are set as close to the goals as feasible. SDWA defines feasible as the level that may be achieved with the use of the best technology, treatment techniques, and other means which US EPA finds (after examination for efficiency under field conditions) are available, taking cost into consideration. When it is not economically or technically feasible to set a maximum level, or when there is no reliable or economic method to detect contaminants in the water, US EPA instead sets a required Treatment Technique which specifies a way to treat the water to remove contaminants.

Setting National Drinking Water Standards:

US EPA sets national standards for tap water which help ensure consistent quality in our nation's water supply. US EPA prioritizes contaminants for potential regulation based on risk and how often they occur in water supplies. (To aid in this effort, certain water systems monitor for the presence of contaminants for which no national standards currently exist and collect information on their occurrence). US EPA sets a health goal based on risk (including risks to the most sensitive people, e.g., infants, children, pregnant women, the elderly, and the immuno-compromised). US EPA then sets a legal limit for the contaminant in drinking water or a required treatment technique—this limit or treatment technique is set to be as close to the health goal as

feasible. US EPA also performs a cost-benefit analysis and obtains input from interested parties when setting standards. US EPA is currently evaluating the risks from several specific health concerns, including: microbial contaminants (e.g., *Cryptosporidium*); the byproducts of drinking water disinfection; radon; arsenic; and water systems that don't currently disinfect their water but get it from a potentially vulnerable ground water source.

Funding and Assistance:

US EPA provides grants to implement state drinking water programs, and to help each state set up a special fund to assist public water systems in financing the costs of improvements (called the drinking water state revolving fund). Small water systems are given special consideration, since small systems may have a more difficult time paying for system improvements due to their smaller customer base. Accordingly, US EPA and states provide them with extra assistance (including training and funding) as well as allowing, on a caseby- case basis, alternate water treatments that are less expensive, but still protective of public health.

Compliance and Enforcement:

National drinking water standards are legally enforceable, which means that both US EPA and states can take enforcement actions against water systems not meeting safety standards. US EPA and states may issue administrative orders, take legal actions, or fine utilities. US EPA and states also work to increase water systems' understanding of, and compliance with, standards.

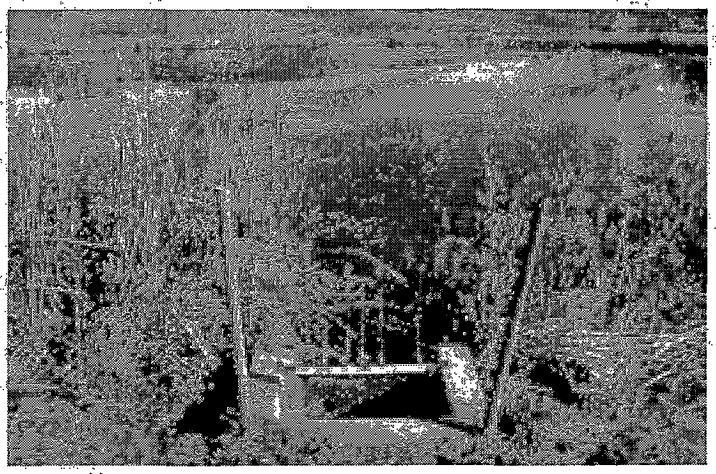
Public Information:

SDWA recognizes that since everyone drinks water, everyone has the right to know what's in it and where it comes from. All water suppliers must notify consumers quickly when there is a serious problem with water quality. Water systems serving the same people year-round must provide annual consumer confidence reports on the source and quality of their tap water. States and US EPA must prepare annual summary reports of water system compliance with drinking water safety standards and make these reports available to the public. The public must have a chance to be involved in developing source water assessment programs, state plans to use drinking water state revolving loan funds, state capacity development plans, and state operator certification programs.



For More Information:

To learn more about the Safe Drinking Water Act or drinking water in general, call the Safe Drinking Water Hotline at 1-800-426-4791, or visit US EPA's Office of Ground Water and Drinking Water web site: *www.epa.gov/safewater*.



City of Flint Drinking Water

Outline prepared by the

Michigan Department of Environmental Quality for the

Flint Water Task Force

I. Introduction

This document is intended to provide an overview of Michigan's implementation of the Safe Drinking Water Act with respect to events in the City of Flint.

II. Background

1. How has Flint historically obtained its drinking water?

The water system in Flint, Michigan, was organized and built under private ownership in 1883 as the Flint Water Works Company to pump raw water from the Flint River to their consumers. In 1903, the system was converted to a municipally owned corporation which supplied drinking water to the City until 1967, when the City switched and become a customer of the Detroit Water and Sewerage Department (DWSD) system. After the switch to DWSD, the city of Flint operated their water treatment plant as a standby, backup emergency plant for purposes of reliability in the event that the single pipeline from DWSD was out of service for any reason.

In 2009, the water treatment plant was operated in this emergency capacity in two instances (dates/number of days). As a backup emergency plant, the city was required to operate the plant quarterly to demonstrate the ability to produce safe water in accordance with Michigan's Safe Drinking Water Act (1976 PA 399) and to keep mechanical equipment in good working order, such as valves, rubber seals, etc. Each time the plant was test run quarterly, samples were taken of raw water quality (describe here) and of finished water (post-filters). Treated water was not put into the distribution system during these test runs, but rather was discharged to the river in accordance with a NPDES Permit (confirm with Steve). The test runs were for demonstration purposes only and to keep the plant operational and staff familiar with operation in the event it was needed in an emergency.

2. What State and Federal laws or rules must be complied with in order to ensure safe drinking water is provided to Flint residents?

The federal Safe Drinking Water Act (SDWA) is the primary law that ensures the quality of Americans' drinking water. Under the SDWA, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.

The federal SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. (SDWA does not regulate private wells which serve fewer than 25 individuals.)

The federal SDWA authorizes the United States Environmental Protection Agency (US EPA) to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. US EPA, states, and water systems then work together to make sure that these standards are met.

Originally, the SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

The most direct oversight of water systems is conducted by state drinking water programs. States can apply to US EPA for "primacy," the authority to implement SDWA within their jurisdictions, if they can show that they will adopt standards at least as stringent as US EPA's and make sure water systems meet these standards. Michigan adopted the Safe Drinking Water Act in 1976 and maintained primacy for the program since 1978? – not sure we let set of rules we called that yet only say "primacy" time

3. **What is EPA's role as a regulatory agency in implementing the SDWA?**

Federal and state governments share responsibility for administering drinking water programs. Under the Safe Drinking Water Act (SDWA), the U.S. Environmental Protection Agency (US EPA) is given the responsibility for developing national standards and regulations that apply to the nation's public drinking water systems and enforcing those standards.

Michigan's drinking water program is reviewed annually by U.S. EPA.

4. **What is DEQ role's as a regulatory agency in implementing the SDWA?**

SDWA also allows states to accept oversight of the drinking water program under an agreement with US EPA giving states primary enforcement (or primacy) responsibilities. In addition to this delegation of federal authority to the states, states also have the power to create additional regulations and programs governing drinking water suppliers through their own legislative and regulatory processes. Michigan has had a regulatory program providing oversight of PWS since 1913, I – could mention the Act?

The DEQ has primary enforcement authority in Michigan for the ~~Safe Drinking Water Act~~ under the legislative authority of the Michigan Safe Drinking Water Act (Act 399). As such, the ~~division~~ has regulatory oversight for all public water supplies, including approximately 1,425 community water supplies and 10,000 noncommunity water supplies.

The State of Michigan DEQ engages in a variety of activities to help water systems remain in, or return to, compliance. These activities include: visiting water systems and reviewing their facilities, equipment, and operations; requiring the submission of plans and specifications for waterworks system improvements and issuing construction permits; providing for the examination, certification and regulation of persons operating water supplies; helping systems invest in preventive measures; providing financial assistance for system improvements~~; and conducting training sessions~~.

5. What is Flint's role in implementing the SDWA?

These federal and state programs are separate from the activities performed by water systems. State and federal programs develop regulations and perform oversight and compliance activities, but do not actually treat or deliver water to customers. At the local level, public and private water utilities collect, treat, and deliver drinking water to consumers.

To ensure that drinking water is safe, SDWA sets up multiple barriers against pollution. These barriers include: source water protection, treatment, distribution system integrity, and public information. As a public water system, the city of Flint is responsible for ensuring that contaminants in tap water do not exceed the standards. The City treats the water, and must test their water frequently for specified contaminants and report the results to the State. If a water system is not meeting these standards, it is the water supplier's responsibility to notify its customers.

The SDWA recognizes that since everyone drinks water, everyone has the right to know what's in it and where it comes from. The City of Flint, like all water suppliers, must notify consumers quickly when there is a serious problem with water quality. Water systems serving the same people year-round must provide annual consumer confidence reports on the source and quality of their tap water.

The city of Flint submits samples of their water for laboratory testing (monitoring) to verify that the water they provide to its residents meets all federal and state standards. How often and where samples are taken varies from system to system and contaminant to contaminant. The State provides an annual monitoring schedule to the City setting forth these requirements.

In addition, the city of Flint is required to maintain on staff, certified water operators that are trained and experienced to operate the treatment and distribution system associated with the city's water system.

III. The Flint River – it is a safe source of drinking water?

In Michigan, we are blessed with high quality drinking water sources. Seventy percent of Michigan's population receives its drinking water from surface water sources, most ~~with intakes~~ in the Great Lakes. A handful of public water supplies in Michigan do treat water from inland ~~sources such as~~ rivers or groundwater under the influence of surface water. ~~While~~ River sources present a greater challenge for treatment because of how rapidly ~~the~~ water quality can change ~~over time~~ compared to Great Lakes sources.

[Our impression is that the average citizen is under the impression that the river water is corrosive and contains lead – we can address no lead, chloride, and lime issues. Address treatment issues to show that water leaving the plant meet all SDWA

requirements. Ph was same as DWSD. Also sets up point that problems arose after water left plant and was disseminated throughout system]

IV. E. Coli and Total Coliform bacteria violations

1. What caused the E.Coli and Total Coliform bacteria violations experienced by Flint in August-September 2014?

A number of factors, not one specific cause, likely contributed to the Boil Water Advisories (BWA's) in the City of Flint during August and September 2014. While use of the Flint River increased the amount of natural organic matter in the City's water, the City's water treatment plant (WTP) performed well above treatment requirements for organic carbon removal. In addition, less than 20% of the water system was included in the advisory area. If treatment had been compromised, detections would have been widespread throughout the City, rather than in such a localized area.

The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of cast iron piping. Cast iron pipe is subject to internal corrosion, called tuberculation, which causes buildup on the pipe interior leading to water quality issues, reduced flow and pressures, and leakage. Tuberculation also encourages the development of biofilms, layers of bacteria that attach to the interior pipe wall. Biofilm growth is common in areas of piping with little or no disinfectant residual, and together with tuberculation can clog water lines to the point of insufficient water pressure.

The City has also experienced decades of a declining user base and water use associated with vacant homes, commercial businesses and industrial property. Declining water use leads to excess residence time within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and disinfectant residual degradation. While the City has recently seen an infusion of funding for blight removal, contractors completing this work have been improperly using fire hydrants, causing hydraulic disturbances that dislodged and suspended settled debris, which may have contributed to the bacterial contamination.

The winter of 2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30%, saw even greater losses since February due to an increase in cold weather related water main breaks and leaks. The City lacks a formal maintenance program for its over 7,250 valves, which would normally be used to limit impacts during break repairs. Two valves on the transmission line used to supply the area of the BWA were found to be closed during the City's investigation, causing longer residence time, reduced disinfectant residual, reduced flow, and reduced pressures.

The BWA's also occurred during the warmest and for 2014 relatively wet periods of August and September. Warm weather conditions are not only more conducive to bacterial growth but also degrade the water's disinfectant residual carried out from the WTP more quickly. Longer residence times, biofilms, and tuberculation also contribute to disinfectant residual degradation. Warm wet weather conditions also allow water contaminated with bacteria to pool around piping with leaks and breaks.

During the summer, the city was actively repairing the distribution system. After the switch to the Flint River, it was discovered that there were many broken or closed valves in the city's distribution system. As the city began correcting this problem they did experience issues of bacteria in the distribution system as a result of the repairs. This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

2. How were the violations detected and what was DEQ's response?

The Boil Water Advisories (BWAs) which occurred in the City of Flint were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the City of Flint collaboratively in consultation with the DEQ.

Regulations regarding monitoring and standards for bacteria in water distribution systems were developed by the EPA, have been in effect since 1990, and incorporated into the Michigan Safe Drinking Water Act. There are a variety of bacteria, parasites, and viruses which can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, water systems test for Total coliform and E.coli. Total coliform bacteria react to water treatment in a manner similar to many pathogens. Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system minimizes the likelihood that pathogens are present. E.Coli is itself a pathogen, and its detection would be direct evidence of a health risk.

Once a BWA has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Using the most common analytical method, samples must be incubated for a period of 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a BWA. Adding each of these steps together, a normal response period to cancel a BWA under these circumstances would be expected to take at least 3 to 4 days.

A BWA was issued from August 15–20, 2014, for a portion of the City of Flint due to localized detections of total coliform and E.Coli bacteria. Another BWA was issued from September 5-9, 2014, due to localized detections of total coliform bacteria in the same and adjacent portions of the City of Flint. The advisory covered an area approximately 6 square miles. The City of Flint has a total land area just over 34 square miles.

V. TTHM violations

1. What caused the TTHM violations experienced by Flint beginning in late Summer 2014?

TTHMs and HAA5s are the result of organic material in the water reacting with disinfectant used to treat the water. The Flint River has higher levels of organic material than water in the Great Lakes and it was not a surprise that the water produced by the city of Flint developed higher disinfection by-products than the water provided by DWSD. However, because the water treatment plant was previously operating intermittently as an emergency backup supply, it was not possible to predict disinfection byproduct formation until the city began relying on it continuously.

2. How were the violations detected and what was DEQ's response?

In preparation to rely on the Flint River, the city installed ozone to help reduce the organic material (known as precursors), but additional measures were necessary. Because TTHM and HAA5 MCLs are calculated based on a running annual average at a specific location, the city didn't actually violate the safe drinking water act standard until the fall, but because it was apparent in the summer of 2014 that the standard would eventually be exceeded, the city was asked to proactively implement measures to address the problem before the violation required them to do so. The city added granular activated carbon to their filters (after receiving a construction permit from DEQ on date?) and levels of TTHMs and HAA5s were reduced. The city returned to compliance with the running annual average (MCL) on September 1, 2015.

IV. The taste, odor, and smell complaints received by Flint

1. What caused the taste and odor complaints received by Flint from residents?

Taste and odor issues are very personalized. Some water systems receive complaints because of too much disinfectant. In Flint, during the summer after the switch to the Flint River as a water source, taste and odor complaints increased. It was believed at the time to be the result of changes in hydraulic conditions within the distribution system. Water leaving the water treatment plant did not have any unusual odor or color. However, construction in the distribution system, hydrant flushing and changes in flow characteristics are all know causes of disturbances with the distribution system that can cause an increase in taste and odor complaints.

2. What was DEQ's response?

DEQ consulted with the city regarding these complaints. The city indicated that they were offering testing for anyone that had issues and that they were not able to verify the complaints. Jugs of discolored water were being brought to meetings, but city personnel were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHM's, it was anticipated that there would be short term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) can and will cause temporary problems as described. Based on information from the city personnel, it appeared that the complaints were related to operational activities occurring in the distribution system.

V. The lead issues in the Flint drinking water

1. What causes lead in drinking water?

Lead is rarely found in source water, but enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead pipes, fixtures and solder. The most common problem is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially hot water. Lead can leach into water from pipes, solder, fixtures and faucets (brass), and fittings. The amount of lead in tap water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the pH of the water, and its temperature.

2. What are the lead action levels?

For most contaminants, EPA sets an enforceable regulation called a maximum contaminant level (MCL) based on the MCLG. MCLs are set as close to the MCLGs as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies. However, because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, EPA established a treatment technique rather than an MCL for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to ensure control of a contaminant. The treatment technique regulation for lead (referred to as the Lead and Copper rule) requires water systems to control the corrosivity of the water. The regulation also requires systems to collect tap samples from sites served by the system that are more likely to have plumbing materials containing lead. If more than 10% of tap water samples exceed the lead action level of 15 parts per billion, then water systems are required to take additional actions including:

•Taking further steps optimize their corrosion control treatment (for water systems serving 50,000 people that have not fully optimized their corrosion control) .

•Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.

•Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

3. Are there any safe levels of lead?

The SDWA requires EPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. These non-enforceable health goals, based solely on possible health risks are called maximum contaminant level goals (MCLG) The MCLG for lead is zero. EPA has set this level based on the best available science which shows there is no safe level of exposure to lead.

4. What is the LCR?

Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. On June 7, 1991, EPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR).

The treatment technique for the rule requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 15 ppb or copper concentrations exceed an action level of 1.3 ppm in more than 10% of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the action level for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control.

5. Did DWSD have a corrosion control plan?

After the LCR was passed, DWSD conducted two rounds of monitoring at for lead and copper. Copper levels were well below action level limits; but lead levels exceeded the action level of 15 parts per billion in many of their customer communities. As a result, DWSD needed to install corrosion control treatment. DWSD performed a corrosion control study and concluded that they could reduce the corrosivity of the water by the addition of an ortho-phosphate.

6. Did DEQ require Flint to have a corrosion control plan in place when it switched to the Flint River as its source of drinking water?

No. The DEQ believed there were two ways under the lead/copper rule to deem a water supply as providing "optimal corrosion control" – either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment. DEQ staff thought it was appropriate to call for the city of Flint to perform two 6-month rounds of monitoring to demonstrate if the city was practicing optimal corrosion control treatment. According to state regulations (R325.604f (2) (iii), a system can demonstrate that it is "practicing optimal corrosion control" by sampling in two, consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the Flint River has 0 ppb lead, the city would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods.

In addition, the city of Flint had been purchasing water from DWSD that was treated for corrosion control. It was DWSD that was considered as having optimized corrosion control at that point. Since the city of Flint had not been the supplier of water before, DEQ did not require the city to "maintain" corrosion control for which it was not responsible. It couldn't "maintain" something that it wasn't doing. As we stated previously, we believed Flint should have been afforded the same opportunity that all other large water systems were

initially granted to demonstrate optimal corrosion control treatment through full scale monitoring. For these reasons, two 6-month rounds of monitoring, as required by the lead/copper rule were felt to be appropriate to determine whether or not optimal corrosion control was being achieved.

7. How does DEQ calculate the 90th percentile?

To determine the 90th percentile of a list of lead or copper results, the following steps are followed:

Step 1: Place lead or copper results in ascending order
Step 2: Assign each sample a number, 1 for lowest value
Step 3: Multiply the total number of samples by 0.9 – this yields the 90th percentile sample. For example: 20 samples x 0.9 = 18th sample. This is the 90th percentile level.

Calculating the 90th percentile is easiest when a supply collects 10 samples (or a multiple of 10). Multiples of 10 require no averaging or interpolation.

8. What was the result of the first round of monitoring conducted by Flint?

The first 6-month round of lead and copper monitoring conducted by the city of Flint ended on December 31, 2014. One hundred samples 100 samples were submitted and the 90th percentile lead level was calculated to be 6 parts per billion.

A 90th percentile lead result of 6 ppb is not unusual. Many water supplies in Michigan and across the country have 90th percentile levels of lead greater than this. Even systems that have installed treatment and are considered optimized by definition can and do have levels above 5 ppb.

9. What was the result of the second round of monitoring conducted by Flint?

The second 6-month round of lead and copper monitoring conducted by the city of Flint ended on June 30, 2015. Sixty nine samples were submitted and the 90th percentile lead level was calculated to be 11 parts per billion. The conclusion from these results was that the city exceeded the level required to be deemed as having optimized corrosion control but did not exceed the action level of 15 parts per billion.

10. What actions did DEQ order Flint to undertake after the second round of monitoring?

While the City's LCR compliance monitoring continued to meet action level requirements, the LCR requires all large systems (those serving over 50,000 people) to optimize corrosion control regardless of their 90th percentile lead concentration. Following receipt of Flint's compliance monitoring results, the DEQ required the city to install corrosion control treatment in correspondence dated August 17, 2015.

Under the LCR, the city has 6 months to let the DEQ know whether it intends to conduct a study, 18 months to perform the study, and 24 months to complete installation of corrosion control. The DEQ has requested the city of Flint to accelerate this schedule. The city submitted plans and specifications to install corrosion control treatment and a construction

permit was issued by DEQ on October 28, 2015. The City is in the process of installing the necessary equipment and procuring the appropriate chemicals. Treatment is expected to be on-line by the end of November.

11. What had DHHS advised DEQ regarding blood lead levels prior to DEQ ordering Flint to implement optimized corrosion control?

In an e-mail dated July 28, 2015, DHHS indicated that they "compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –

- Lead testing rates remained about the same from year to year (chart on the right).
- There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).
- However that pattern was not terribly different from what we saw in the previous three years, especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).
- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspect that the summer data spike may be related to this effect.
- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015."

Insert GRAPHS?

This e-mail in concert with the completion of two 6-month rounds of lead compliance sampling data indicating that the City of Flint had not exceeded an action level for lead provided the basis for DEQ to maintain that the water in Flint continued to be in compliance with the SDWA and was safe for consumption.

12. When did DEQ first become aware of allegations of elevated blood levels being detected in certain children?

The DEQ was notified on August 23, 2015 by a professor from Virginia Tech that "over the next few months we will be studying Flint water quality issues…" and similarly notified by U.S. EPA on August 28, 2015. Results indicating elevated lead levels in homes were reported as part of this study in late August.

By this time, the City of Flint had already completed the required two 6-month rounds of monitoring and a determination had been made by the DEQ that the City must install corrosion control treatment (n

[Hurley and Edwards all after the fact]

VI. Questions raised regarding DEQ's actions

1. What was DEQ's response to EPA's inquiry in February 2015 regarding the optimized corrosion control treatment being implemented by Flint under the LCR?

DEQ indicated that the city was in compliance with the lead/copper rule. 90th percentile levels were below the Action Level and not unusual. The city was already conducting the second round of monitoring which would provide for a determination of whether ~~or not~~ ~~second round of monitoring which would provide for a determination of whether~~ or not additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the ~~lead/copper rule~~ that lead or copper results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile action level in the rule.

2. Did DEQ attempt to mislead EPA in a February 27, 2015 email responding to EPA's inquiry regarding OCCT?

No. There is an e-mail from Steve Busch indicating that the city was practicing corrosion control. This was a misstatement. What was meant was that the city was performing the required monitoring to determine whether or not they were "practicing optimal corrosion control". It was clarified in follow-up telephone conversations with EPA.

3. Has EPA subsequently admitted that the LCR is subject to differing interpretations such as that presented by DEQ?

On November 3, 2015, U.S. EPA issued a Memorandum regarding the "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems". This memorandum addresses concerns raised about the application of the LCR, specifically the requirements pertaining to maintenance of optimal corrosion control treatment, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. The memo states that this type of situation rarely arises, that the language of the LCR does not specifically discuss such circumstances, and that there are differing possible interpretations of the LCR with respect to how the rule's optimal corrosion control treatment procedures apply to this situation. The memo is intended to clarify prospectively steps agencies should take/apply in the future.

DEQ action not just differing interpretation of rule

4. Did DEQ reject any of the samples submitted by Flint?

Yes, samples at two locations were excluded from the compliance calculation.

Compliance samples must be a first draw, 1 liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted sampling sites, called tier 1 sampling sites. For a municipality such as the City of Flint, the tier 1 sampling pool must consist of single family structures that are:

- served by a lead service line,
- contain lead pipes, or
- contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

Furthermore, if a community has tier 1 sites that contain lead services, they are required to have at least 50% of their compliance samples collected from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters, etc. One of the samples submitted by Flint that was excluded from the 90th percentile compliance calculation in the latest monitoring period was taken from a tap at a non-residential site, and the other sample result that was removed was collected from a single family home that has whole house treatment system (check with Steve). Both of these sites are therefore statutorily excluded from the compliance consideration. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point of use or point of entry treatment can only be used if the community has insufficient tier 1 sites available.

5. **Did DEQ review the information submitted by Flint to ensure all samples were from Tier 1 sites?**

6. **Did DEQ believe the levels of lead found at 212 Browning in April 2015 were indicative of a system-wide problem?**

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The reason for this connection is unknown. The city replaced the lead service line. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem. Subsequent sampling taken at this address showed that replacement of the service line mitigated the problem. There was also no reason to believe that this was indicative of a system-wide problem.

7. **Do DEQ's sampling instructions comply with the LCR?**

8. **Does DEQ require the use of small-neck bottles to obtain samples?** – At the lab

9. **Why was Flint required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?**

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of the Michigan SDWA.

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples Flint was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census (check with Steve), which listed the city's population as more 100,000 residents. In March of 2015, the city provided an updated census that indicated the city's population had decreased to less than 100,000 (check with Steve). Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

10. Why did DEQ admit it made a mistake?

Shekter Smith, Liane (DEQ)

From: Prysby, Mike (DEQ)
Sent: Monday, October 13, 2014 3:48 PM
To: Busch, Stephen (DEQ); Shekter Smith, Liane (DEQ); Wurfel, Brad (DEQ); Feuerstein, Heather (DEQ); Willard, Veronica (DEQ); Benzie, Richard (DEQ)
Subject: Media Inquiry

Ron Fonger from the Flint Journal called me today concerning the GM Engine manufacturing plant in Flint and their intent to temporarily terminate water service from Flint and purchase water from Genesee County (via Flint Twp) until Flint is either treating water from KWA or reducing their chloride concentration from their treated water that meets GM's limit for manufacturing. Ron asked if elevated chlorides are a health concern in Flint. I looked up Flint's MOR and noted that the treated water chloride concentration leaving the WTP ranges between 55 and 65 mg/l which, although not optimal (optimal being <20 mg/l), is satisfactory. Concentrations > 250 mg/l become objectionable due to taste & corrosion issues; however, based on the concentration leaving the WTP, we did not have any health-effect concerns. Ron was not able to recall the maximum chloride level acceptable to GM; however, I stressed the importance of not branding Flint's water as "corrosive" from a public health standpoint simply because it does not meet a manufacturing facility's limit for production. Ron also asked if the treatment process adds chloride. I explained that their primary coagulant is ferric chloride and this does add some chloride to the finished water; however, raw water chloride concentration is generally in the mid 40s mg/l; thus, the contribution from ferric chloride is not significant.

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 290-8817

Privileged Attorney Client Communication

DRAFT

7. Do the DEQ's sampling instructions comply with the LCR?

We continue to disagree with the USEPA on sampling protocols. We have attempted to ensure compliance with the USEPA's guidance provided in the preamble to their lead and copper regulations that said that household use should be "typical" for a residential customer on the day before sample collection for lead and copper. Early in the implementation of the LCR, we had encountered too many situations where compliance samples had been collected from kitchen and bathroom taps that had not been used in days and in some cases, even weeks, resulting in excessively stagnated water and correspondingly high lead levels that did not represent typical exposure expected after overnight stagnation. To incorporate these results into further regulatory decision making could have led to actions that were not indicative of a true public health threat. Further complicating this issue was the USEPA's direct implementation of the LCR in Washington, D.C., where it was learned that some "valid" lead results were not always being included in compliance calculations. Subsequently, the USEPA made invalidation of samples for any reason much more difficult. In order to ensure samples were taken at customer taps representative of typical use, we devised our current recommendations for ensuring appropriate but not excessive stagnation for LCR monitoring.

We continue to believe it is appropriate to flush these taps the day before sample collection to simulate and/or ensure typical household use before the tap is allowed to sit overnight to achieve the expected stagnation time (the regulation recommends a minimum 6 hours stagnation prior to collecting the first draw sample). The LCR does not say the result should represent the "absolute worst case" condition – it talks about sampling the highest risk locations (lead plumbing, lead service lines, high lead content solder piping, etc.) after overnight stagnation and then collecting a first draw sample so as not to flush elevated lead from that tap at that point in time. Until the USEPA changes this rule, we are satisfied with our sampling protocol.

8. Does the DEQ require the use of small-neck bottles to obtain samples?

No. The DEQ does not mandate the use of small-neck bottles. It is the sampling method that is specified in both the federal SDWA and Act 399. Each certified drinking water laboratory provides bottles to their customers upon request for any particular analysis. The bottles provided by the DEQ Drinking Water Laboratory for a lead and copper corrosion control sample do happen to have a small cap opening.

9. Why did the DEQ admit mistakes and apologize?

The mounting Freedom of Information Act Requests brought to the Director's attention, information from within the DEQ that was not previously known to Director Dan Wyant – specifically, that the USEPA field staff had raised the question of corrosion control in the spring of 2015 and had been critical of the DEQ's protocol and testing process. It seemed clear that the USEPA field staff had opined that DEQ staff had employed the incorrect protocol. In the face of that new information, Direct Wyant felt compelled to acknowledge that an error may have been made as part of moving the conversation and the situation forward.

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DRAFT

The subsequent acknowledgement by the USEPA's regional and headquarters leadership that the LCR speaks ambiguously on the issue of continued corrosion control, and that the DEQ did not employ a protocol that was 'wrong,' was of considerable consolation to the DEQ staff but only left agency leadership feeling more resolute that the LCR needs to be changed, and the DEQ is interested in being part of that process.

Also, there should not have been any disrespect or discredit for those who raised the lead in water issue in Flint. For a tone that did not recognize the seriousness of the issue, Director Wyant did apologize.

DEQ?

We = DEQ

Add: official clarification

Why is this Q important?

word choice "will continue to use" ... the Michigan ...

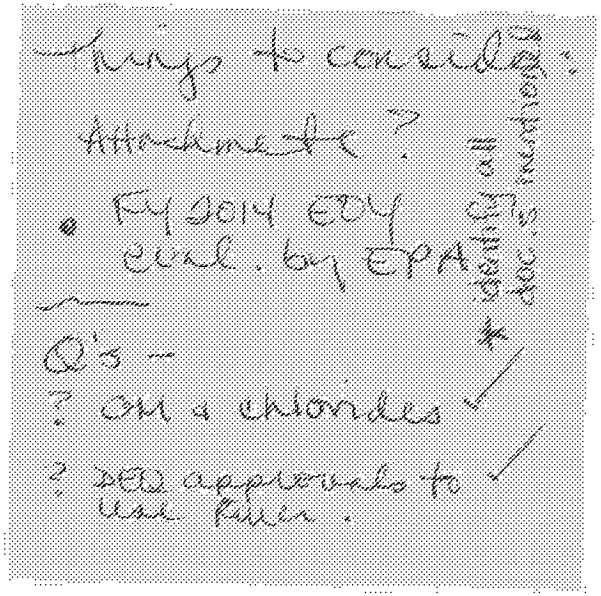
Two finger/salute suggest nastiness.

Rework This!

What Mistake did DEQ Dept Director refer to regarding DEQ's actions on date?

- The LCR is "ambiguous" (as evidenced by EPA letter)
- Upon immediate analysis, it appeared that DEQ did not employ the appropriate protocol for a city of >50,000 as ~~[illegible]~~ could be ~~[illegible]~~ read from the LCR.
- On _____ date, the EPA, provided new national guidelines for LCR compliance, including an "ambiguity" in the Rule.
- DEQ Director regrets _____ those raising the lead issue in Flint, and DEQ apologizes to those who may not believe the DEQ's tone might have discredited their concerns

The DEQ will be actively pursuing As to the LCR to prevent such situation in other cities in future.


Things to consider:
attachment?
FY 2014 EOY
cert. by EPA
Q's -
? on a chromebook
? DEQ approved to
use Fusion.

City of Flint Drinking Water
Outline prepared by the
Michigan Department of Environmental Quality for the
Flint Water Task Force

I. INTRODUCTION

This document is intended to provide an overview of Michigan's implementation of the Safe Drinking Water Act, 1976 PA 399, as amended (Act 399), with respect to events in the city of Flint (City), Michigan.

II. BACKGROUND

1. How has Flint historically obtained its drinking water?

The water system in the City was organized and built under private ownership in 1883 as the Flint Water Works Company to pump raw water from the Flint River to their consumers. In 1903, the system was converted to a municipally-owned corporation which supplied drinking water to the City. In 1967, the City switched and became a customer of the Detroit Water and Sewerage Department (DWSD) system. After the switch to DWSD, the City operated their water treatment plant as a standby, ~~backup emergency~~ plant for purposes of reliability in the event that the single pipeline from DWSD ~~was out of service for any reason~~ had an emergency such as an interruption in service during high demand. In 2009, the water treatment plant was ~~operated~~ used in this emergency capacity in two instances (dates/number of days). Additionally, as a backup emergency plant, the City was required to operate the plant quarterly to demonstrate the ability to produce safe water in accordance with Act 399 and to keep mechanical equipment (such as valves, rubber seals, etc.) in good working order. Each ~~time~~ quarter the plant was test run ~~quarterly~~, samples were taken of raw water ~~quality~~ (describe here) and of finished water (post-filters). Treated water was not put into the distribution system during these test runs, but rather was discharged to the river in accordance with a National Pollutant Discharge Elimination System (NPDES) Permit (confirm with Steve). The test runs were for demonstration purposes ~~only~~, to keep the plant operational and staff familiar with operation in the event it was needed in an emergency. because of contractual obligations with DWSD.

2. What State and Federal laws or rules exist to ensure safe drinking water is provided to City residents?

The federal Safe Drinking Water Act (federal SDWA) is the primary law that ensures the quality of Americans' drinking water. Under the federal SDWA, the United States Environmental Protection Agency (USEPA) sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.

The federal SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. (The federal SDWA does not regulate private wells which serve fewer than 25 individuals.)

The federal SDWA authorizes the USEPA to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. USEPA, states, and water systems, then work together to make sure that these standards are met.

Originally, the federal SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

The most direct oversight of water systems is conducted by state drinking water programs. States can apply to the USEPA for "primacy," the authority to implement the federal SDWA within their jurisdictions if they ~~can show that~~ they will adopt standards at least as stringent as the USEPA's and ~~make sure water systems meet these~~ enforce them standards. Michigan adopted the Safe Drinking Water Act in 1976 through Act 399 and maintained primacy for the program since 1978 that time.

3. **What is the USEPA's role as a regulatory agency in implementing the SDWA?**

Federal and state governments share responsibility for administering drinking water programs. Under the federal SDWA, the USEPA is given the responsibility for developing national standards and regulations that apply to the nation's public drinking water systems and enforcing those standards, by working with states.

Michigan's drinking water program is reviewed annually by the USEPA.

4. **What is the Michigan Department of Environmental Quality's (DEQ) role as a regulatory agency in implementing the SDWA?**

The federal SDWA ~~also allows~~ permits states to accept oversight of the drinking water program under an agreement with the USEPA giving states primary enforcement (or primacy) responsibilities. In addition to this delegation of federal authority to the states, states also have the power to create additional regulations and programs governing drinking water suppliers through their own legislative and regulatory processes. Michigan has had a regulatory authority providing oversight of public water supplies since 1913

The DEQ has primary enforcement authority in Michigan for the federal SDWA under the legislative authority of Act 399. As such, the DEQ, Office of Drinking Water and Municipal Assistance (ODWMA) has regulatory oversight for all public water supplies, including approximately 1,425 community water supplies and 10,000 noncommunity water supplies.

(waterworks and Sewage Systems Act 98 of 1913)

The DEQ engages in a variety of activities to help water systems remain in, or return to, compliance. These activities include: conducting surveillance visits of water systems and reviewing their facilities, equipment, and operations; requiring the submission of plans and specifications for waterworks system improvements and issuing construction permits; providing for the examination, certification and regulation of persons operating water supplies; helping

training

systems invest in preventive measures, providing financial assistance for system improvements; ~~and conducting training sessions~~.

5. **What is the City's role in implementing the federal SDWA?**

State and federal programs develop regulations and perform oversight and compliance activities, but do not actually treat or deliver water to customers. At the local level, public and private water utilities collect, treat, and deliver drinking water to consumers.

To ensure that drinking water is safe, the federal SDWA sets up multiple barriers against pollution. These barriers include: source water protection, treatment, distribution system integrity, and public information. As a public water system, the City is responsible for ensuring that contaminants in tap water do not exceed the standards. The City treats the water, and must test their water frequently for specified contaminants and report the results to the DEQ. If a water system is not meeting these standards, it is the water supplier's responsibility to notify its customers.

The federal SDWA recognizes that ~~since everyone drinks water, everyone~~ has the right to know what is in it and where it comes from. The City, like all water suppliers, must notify consumers quickly when there is a serious problem with water quality. Water systems serving the same people year-round must provide annual consumer confidence reports (CCR) on the source and quality of their tap water.

The City submits samples of their water for laboratory testing (monitoring) to verify the water they provide to residents meets all federal and state standards. How often and where samples are taken varies from system to system and contaminant to contaminant. The DEQ provides an annual monitoring schedule to the City setting forth these requirements.

In addition, the City is required to ~~maintain on staff~~ certified water operators that are trained and experienced to operate the treatment and distribution system associated with the City's water system.

III. THE FLINT RIVER – IS IT A SAFE SOURCE OF DRINKING WATER?

In Michigan, we are blessed with high quality drinking water sources. Seventy percent of Michigan's population receives its drinking water from surface water sources, most with intakes in the Great Lakes. A handful of public water supplies in Michigan do treat water from inland sources such as rivers or groundwater under the influence of surface water. While river sources present a greater challenge for

[Our impression is that the average citizen is under the impression that the river water is corrosive and contains lead – we can address no lead, chloride, and lime issues. Address treatment issues to show that water leaving the plant meet all SDWA requirements. Ph

was same as DWSD. Also sets up point that problems arose after water left plant and was disseminated throughout system]

IV. *E. COLI* AND TOTAL COLIFORM BACTERIA VIOLATIONS

1. What caused the *E.Coli* and total coliform bacteria violations experienced by the City in August and September 2014?

A number of factors, not one specific cause, likely contributed to the Boil Water Advisories (BWAs) in the City during August and September 2014. While use of the Flint River increased the amount of natural organic matter in the City's water, the City's water treatment plant (WTP) performed well above treatment requirements for organic carbon removal. In addition, less than 20 percent of the water system was included in the BWA area. If treatment had been compromised, detections would have been widespread throughout the City, rather than in such a localized area.

Instead, the violations seem to have been caused by other factors such as aging infrastructure and unusual weather patterns. The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of cast iron piping. Cast iron pipe is subject to internal corrosion, called tuberculation, which causes buildup on the pipe interior leading to water quality issues, reduced flow and pressures, and leakage. Tuberculation also encourages the development of biofilms, layers of bacteria that attach to the interior pipe wall. Biofilm growth is common in areas of piping with little or no disinfectant residual, and together with tuberculation can clog water lines to the point of insufficient water pressure.

The City has also experienced decades of a declining user base and water use associated with vacant homes, commercial businesses and industrial property. Declining water use leads to water spending excess time within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and disinfectant residual degradation. While the City has recently seen an infusion of funding for blight removal, contractors completing this work have been improperly using fire hydrants, causing hydraulic disturbances that dislodged and suspended settled debris, which may have contributed to the bacterial contamination.

The winter of 2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30 percent, saw even greater losses since February 2015 due to an increase in cold weather-related water main breaks and leaks. The City lacks a formal maintenance program for its 7,250+ valves, which would normally be used to limit impacts during break repairs. Two valves on the transmission line used to supply the area of the BWA were found to be closed during the City's investigation, causing longer residence time, reduced disinfectant residual, reduced flow, and reduced pressure.

The BWAs also occurred during the warmest and relatively wet periods of August and September 2014. Warm weather conditions are not only more conducive to bacterial

RB & re-type

growth but also degrade the water's disinfectant residual carried out from the WTP more quickly. Longer residence times, biofilms, and tuberculation also contribute to disinfectant residual degradation. Warm wet weather conditions also allow water contaminated with bacteria to pool around piping with leaks and breaks. [Why are we talking about the winter of 2014 and then the summer of 2014, this is confusing]

During the summer, the City was actively repairing the distribution system. After the switch to the Flint River, it was discovered that there were many broken or closed valves in the City's distribution system. As the City began correcting this problem, they did experience issues of bacteria in the distribution system as a result of the repairs. This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

2. How were the violations detected? What was the DEQ's response?

Regulations regarding monitoring and standards for bacteria in water distribution systems ~~were developed by the USEPA, have been in effect since 1990, and~~ are incorporated into Act 399. There are a variety of bacteria, parasites, and viruses which can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, water systems test for total coliform and *E.coli*. Total coliform bacteria ~~react to water treatment in a manner similar to many pathogens.~~ Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system indicates a minimal likelihood that pathogens are present. *E.Coli* is itself a pathogen and its detection ~~would be~~ direct evidence of a health risk ~~and Water Service Interruptions~~ is considered.

The BWAs which occurred in the City were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the City collaboratively in consultation with the DEQ.

Once a BWA has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Using the most common analytical method, samples must be incubated for 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a BWA. Adding each of these steps together, a normal response period to cancel a BWA under these circumstances would be expected to take ~~at least~~ 3 to 4 days.

A BWA was issued from August 15 thru 20, 2014, for a portion of the City due to localized detections of total coliform and *E.Coli* bacteria. Another BWA was issued from September 5 thru 9, 2014, due to localized detections of total coliform bacteria in the same and adjacent portions of the City. The advisory covered an area approximately 6 square miles. ~~The City has a total land area just over 34 square miles.~~

V. TOTAL TRIHALOMETHANES (TTHM) VIOLATIONS

1. What caused the TTHM violations experienced by the City beginning in late summer 2014?

TTHMs and halogenated acetic acids (HAAS) are the result of organic material in the water reacting with disinfectant used to treat the water. The Flint River has higher levels of organic material than water in the Great Lakes and as a result the water produced by the City developed higher disinfection byproducts than the water provided by DWSD. However, because the WTP was previously operating intermittently as an emergency backup supply, it was not possible to predict disinfection byproduct formation until the City began relying on it continuously.

2. How were the violations detected? What was the DEQ's response?

In preparing to rely on the Flint River, the City installed ozone to help reduce the organic material (known as precursors), but additional measures were necessary. Because TTHM and HAAS maximum contaminant levels (MCLs) are calculated based on a running annual average at specific locations, the City did not actually violate the federal SDWA standard until the fall, ~~but because~~ however it was apparent in the summer of 2014 that the standard would eventually be exceeded, the City was asked to proactively implement measures to address the problem before the violation required them to do so. The City added granular activated carbon to their filters (after receiving a construction permit from the DEQ on date?) and levels of TTHMs and HAASs were reduced. The City returned to compliance with the running annual average (MCL) on September 1, 2015.

VI. THE TASTE, ODOR, AND SMELL COMPLAINTS RECEIVED BY FLINT

1. What caused the taste and odor complaints received by the City from residents?

Taste and odor issues are very personalized. Some water systems receive complaints because of too much disinfectant. In the City, during the summer after the switch to the Flint River as a water source, taste and odor complaints increased. ~~It was believed~~ at the time ~~to be the result of~~ changes in hydraulic conditions within the distribution system. Water leaving the WTP did not have any unusual odor or color. However, construction in the distribution system, hydrant flushing, and changes in flow characteristics are all known causes of disturbances with the distribution system that can cause an increase in taste and odor ~~complaints.~~ Taste and odor ~~complaints,~~ while a concern, are not a threat to public health.

2. What was the DEQ's response?

The DEQ consulted with the City regarding these complaints. The City indicated that they were offering testing for anyone that had issues and that they were not able to verify the complaints. Jugs of discolored water were being brought to meetings, but City personnel were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to

help control TTHMs, it was anticipated that there would be short term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) often causes temporary problems as described. Based on information from City personnel, it appeared that the complaints were related to operational activities occurring in the distribution system.

VII. THE LEAD ISSUES IN THE FLINT DRINKING WATER

1. What causes lead in drinking water?

Lead is rarely found in source water, but enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead ~~Pipes,~~ fixtures, and solder. The most common problem is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially hot water. ~~Lead can leach into water from pipes, solder, fixtures and faucets (brass), and fittings.~~ [REDUNDANT] The amount of lead in tap water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the pH of the water, and its temperature.

2. What are the lead action levels (ALs)?

For most contaminants, the USEPA sets an enforceable regulation called an MCL based on the MCL Goal (MCLG). MCLs are set as close to the MCLGs as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants at the WTP using suitable treatment technologies. However, because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, the USEPA established a treatment technique rather than an MCL for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to ensure control of a contaminant. The treatment technique regulation for lead (referred to as the Lead and Copper Rule) requires water systems to control the corrosivity of the water. The regulation also requires systems to collect tap samples from sites served by the system that are more likely to have plumbing materials containing lead. If more than 10 percent of tap water samples exceed the lead AL of 15 parts per billion (ppb), then water systems are required to take additional actions including:

*Taking further steps to optimize their corrosion control treatment (for water systems serving 50,000 people that have not fully optimized their corrosion control).

*Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.

*Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

3. Are there any safe levels of lead?

The federal SDWA requires the USEPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. These non-enforceable health goals, based solely on possible health risks are called MCLG. The MCLG for lead is zero. The USEPA has set this level based on the best available science which shows there is no safe level of exposure to lead.

4. What is the Lead and Copper Rule?

Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. On June 7, 1991, the USEPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR).

The treatment technique for the rule requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 15 ppb or copper concentrations exceed an action level of 1.3 parts per million (ppm) in more than 10 percent of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the AL for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control.

5. Did DWSD have a corrosion control plan?

After the LCR passed in 1991, DWSD conducted two rounds of monitoring for lead and copper. Copper levels were well below AL limits; but lead levels exceeded the AL of 15 ppb in many of their customer communities. As a result, DWSD ~~needed to~~ installed corrosion control treatment. DWSD performed a corrosion control study and concluded that they could reduce the corrosivity of the water by the addition of an ortho-phosphate.

6. Did the DEQ require the City to have a corrosion control plan in place when it switched to the Flint River as its source of drinking water?

No. The DEQ believed municipalities had two options under the LCR to deem a water supply as providing "optimal corrosion control" – either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment. DEQ staff thought it was appropriate to require the City to perform two 6-month rounds of monitoring to demonstrate if the City was practicing optimal corrosion control treatment. According to state regulations (R325.604f (2) (iii), a system can demonstrate that it is "practicing optimal corrosion control" by sampling in two, consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the Flint River has 0 ppb lead, the City would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods.

In addition, the City had been purchasing water from DWSD that was treated for corrosion control. It was DWSD that was considered as having optimized corrosion control at that

point. Since the City had not been the supplier of water before, the DEQ did not require the City to "maintain" corrosion control for which it was not responsible. It could not "maintain" something that it was not doing. ~~As we stated previously~~, we believed Flint should have been afforded the same opportunity that all other large water systems were initially granted to demonstrate optimal corrosion control treatment through full scale monitoring. For these reasons, two 6-month rounds of monitoring, as required by the LCR were felt to be appropriate to determine whether or not optimal corrosion control was being achieved.

7. How does the DEQ calculate the 90th percentile?

To determine the 90th percentile of a list of lead or copper results, the ~~following steps are~~ procedure below is followed:

Step 1: Place lead or copper results in ascending order
Step 2: Assign each sample a number, 1 for lowest value
Step 3: Multiply the total number of samples by 0.9 – this yields the 90th percentile sample. For example: 20 samples x 0.9 = 18th sample. This is the 90th percentile level.

Calculating the 90th percentile is easiest when a supply collects 10 samples (or a multiple of 10). Multiples of 10 require no averaging or interpolation.

8. What was the result of the first round of monitoring conducted by the City?

The first 6-month round of lead and copper monitoring conducted by the City ended on December 31, 2014. One hundred samples were submitted and the 90th percentile lead level was calculated to be 6 ppb.

A 90th percentile lead result of 6 ppb is not unusual and did not approach the action level or once alarm. Many water supplies in Michigan and across the country have 90th percentile levels of lead greater than this. Even systems that have installed treatment and are considered optimized by definition can and do have levels ~~above 5 ppb – in this range~~ between 5 ppb and 15 ppb.

9. What was the result of the second round of monitoring conducted by Flint?

The second 6-month round of lead and copper monitoring conducted by the City ended on June 30, 2015. Sixty-nine samples that complied with the site selection criteria were submitted and the 90th percentile lead level was calculated to be 11 ppb. The conclusion from these results was that the City exceeded the level required to be deemed as having optimized corrosion control ~~but did not exceed the AL of 15 ppb.~~ while in compliance with the action level

Insert Q. 9 from last page here.

10. What actions did the DEQ order the City to undertake after the second round of lead monitoring?

While the City's LCR compliance monitoring continued to meet AL requirements, the ~~LCR requires all large systems (those serving over 50,000 people) to optimize corrosion control regardless of their 90th percentile lead concentration.~~ Following receipt of the City's

exceedance level required to be delayed as having

compliance monitoring results, the DEQ required the City to install corrosion control treatment in correspondence dated August 17, 2015.

Under the LCR, the City has 6 months to let the DEQ know whether it intends to conduct a study, 18 months to perform the study, and 24 months to complete installation of corrosion control. The DEQ has requested the City to accelerate this schedule. The City submitted plans and specifications to install corrosion control treatment and a construction permit was issued by the DEQ on October 28, 2015. The City is in the process of installing the necessary equipment and procuring the appropriate chemicals. Treatment is expected to be on-line by the end of November 2015.

11. What had Department of Health and Human Services (DHHS) advised the DEQ regarding blood lead levels prior to the DEQ ordering the City to implement optimized corrosion control?

In an e-mail dated July 28, 2015, DHHS indicated that they "compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –

* Lead testing rates remained about the same from year-to-year (chart on the right).

* There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).

* However, that pattern was not terribly different from what we saw in the previous three years; especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).

* We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspected that the summer data spike may be related to this effect.

* If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015."

Insert GRAPHS?

This e-mail in concert with the completion of two 6-month rounds of lead compliance sampling data indicating that the City had not exceeded an AL for lead provided the basis for the DEQ to maintain that the water in the City continued to be in compliance with the federal SDWA and was safe for consumption.

12. When did the DEQ first become aware of allegations of elevated blood levels being detected in certain children?

The DEQ was notified on August 23, 2015, by a professor from Virginia Tech that "over the next few months we will be studying Flint water quality issues..." and similarly notified by the USEPA on August 28, 2015. Results indicating elevated lead levels in homes were reported as part of this study in late August 2015.

By this time, the City had already completed the required two 6-month rounds of monitoring and a determination had been made by the DEQ that the City must install corrosion control treatment in

[Hurley and Edwards all after the fact]

VIII. QUESTIONS RAISED REGARDING THE DEQ'S ACTIONS

1. **What was the DEQ's response to the USEPA's inquiry in February 2015 regarding the optimized corrosion control treatment being implemented by the City under the LCR?**

The DEQ indicated that the City was in compliance with the LCR. 90th percentile levels were below the AL and not unusual. The City was already conducting the second round of monitoring which would provide for a determination of whether ~~by-pass~~ additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the LCR that lead or copper results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile AL in the LCR.

2. **Did the DEQ attempt to mislead the USEPA in a February 27, 2015, e-mail responding to the USEPA's inquiry regarding Optimal Corrosion Control Treatment (OCCT)?**

No. There is an e-mail from Steve Busch indicating that the City was practicing corrosion control. This was a misstatement. What was meant was that the City was performing the required monitoring to determine whether or not they were "practicing optimal corrosion control". It was clarified in follow-up telephone conversations with the USEPA.

3. **Has the USEPA subsequently admitted that the LCR is subject to differing interpretations such as that presented by the DEQ?**

Yes. On November 3, 2015, the USEPA issued a Memorandum to all 50 states regarding the "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems". This memorandum addresses concerns raised about the application of the LCR, specifically the requirements pertaining to maintenance of OCCT, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. The memo states that this type of situation rarely arises, that the language of the LCR does not specifically discuss such circumstances, and that there are differing possible interpretations of the LCR with respect to how the rule's OCCT procedures apply to this situation. The memo is intended to clarify prospectively steps agencies should take or apply in the future.

DEQ maintains . . .

4. Did the DEQ reject any of the samples submitted by the City?

Yes, samples at two locations were excluded from the compliance calculation.

According to the LCR, compliance samples must be a first draw, 1-liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted sampling sites, called Tier 1 sampling sites. For a municipality such as the City, the Tier 1 sampling pool must consist of single family structures that are:

high risk

- served by a lead service line,
- contain lead pipes, or
- contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

As long as a community has Tier 1 sites that contain lead services, they are required to collect at least 50 percent of their compliance samples from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters, etc.

One of the samples submitted by the City was excluded from the 90th percentile compliance calculation in the latest monitoring period because it was taken from a tap at a non-residential site. The other sample result that was removed was collected from a single family home that has a whole house treatment system (check with Steve). Both of these sites are therefore statutorily excluded from the compliance consideration. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point-of-use or point-of-entry treatment can only be used if the community has insufficient Tier 1 sites available.

5. Did the DEQ review the information submitted by the City to ensure all samples were from Tier 1 sites?

6. Did the DEQ believe the levels of lead found at 212 Browning in April 2015 were indicative of a system-wide problem?

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The reason for this connection is unknown. The City replaced the lead service line (when). Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem, and subsequent sampling taken at this address showed that replacement of the service line did mitigate the problem. There was, therefore, also no reason to believe that this was indicative of a system-wide problem.

7. **Do the DEQ's sampling instructions comply with the LCR?**

8. **Does the DEQ require the use of small-neck bottles to obtain samples?**

9. **Why was the City required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?**

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of Act 399.

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples the City was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census (check with Steve), which listed the City's population as more 100,000 residents. In March of 2015, the City provided updated information that indicated the City's population had decreased to less than 100,000 (check with Steve). Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

10. **Why did the DEQ admit it made a mistake?**

Benzie, Richard (DEQ)

To: Shekter Smith, Liane (DEQ)
Subject: RE: ATTORNEY-CLIENT PRIVILEGE WORK PRODUCT: Draft paragraph - needs review and additional data.

Here's my suggested edits.

From: Shekter Smith, Liane (DEQ)
Sent: Friday, November 13, 2015 11:18 AM
To: Benzie, Richard (DEQ); Prysby, Mike (DEQ)
Cc: Kuhl, Richard (AG)
Subject: ATTORNEY-CLIENT PRIVILEGE WORK PRODUCT: Draft paragraph - needs review and additional data.
Importance: High

I. **The Flint River – is it a safe source of drinking water?**

In Michigan, we are fortunate to have high quality drinking water sources. Seventy percent of Michigan's population receives its drinking water from surface water sources, the majority of which is withdrawn from the Great Lakes. A handful of public water supplies in Michigan do treat water from inland rivers, lakes or groundwater under the influence of surface water. All surface water sources and groundwater under the influence of surface water requires significant treatment in order to be safe for consumption. Treatment of surface water is referred to under Act 399 as "complete treatment". While all surface water sources must receive this higher level of treatment, river sources present a greater challenge than water withdrawn from one of the Great Lakes. River sources are more challenging to treat because of how rapidly water quality may change compared to Great Lakes Sources. Under most circumstances, rivers are also prone to greater fluctuations in temperature, have higher amounts of organic material, greater turbidity (suspended solids), and more microbiological and viral contamination than Lakes Huron, Erie, Michigan or Superior. It should be noted, that while the water chemistry in the Flint River differs from that in Lake Huron, it can still be treated in accordance with the SDWA and Act 399. Many cities across the country rely on similar sources for drinking water. The waterworks industry has the technology to treat wide ranging source waters to provide potable and palatable drinking water, including direct reuse of wastewater. Regardless of source water quality, all public water systems must comply with the same drinking water standards in the finished water.

Also, it is not the source water that reacts with the homeowners plumbing in the distribution system, but rather the finished water quality that is important. To begin with, neither the Flint River nor the treated water leaving the City of Flint's water treatment plant contains lead. In addition, the treatment process employed by the City of Flint includes lime softening to reduce the hardness in the river water. Lime softening is not a process that would typically be thought to increase corrosivity of water. The City of Flint, however, does practice recarbonation to re-adjust pH at the end of the softening process. pH levels of finished water leaving the City of Flint's water treatment plant averaged 7.7. Water monitoring conducted quarterly at 25 sample sites located throughout the distribution system showed the following:

July – September 2014	average pH = 7.71	range: 7.56 – 7.86
October – December 2014	average pH = 7.88	range: 7.62 – 8.10
January – March 2015	average pH = 7.81	range: 7.60 – 7.99
April – June 2015	average pH = ???	range: ???

These numbers compare to the water delivered by DWSD. NEED TO INSERT HERE.

Background –

Prior to switching from DWSD, the city of Flint operated a water treatment plant as a standby, backup emergency plant for purposes of reliability in the event that the single pipeline from DWSD failed.

In 2009, the water treatment plant was operated in this emergency capacity in two instances (dates/number of days). As a backup emergency plant, the city was required to operate the plant quarterly to demonstrate the ability to produce safe water in accordance with Act 399 and to keep mechanical equipment in good working order, such as valves, rubber seals, etc. Each time the plant was test run quarterly, samples were taken of raw water quality (describe here) and of finished water (post-filters). Treated water was not put into the distribution system during these test runs, but rather was discharged to the river in accordance with a NPDES Permit (confirm with Steve). The test runs were for demonstration purposes only and to keep the plant operational and staff familiar with operation in the event it was needed in an emergency.

Do we want to note that the original decision was to join KWA and begin receiving water in ~3 years from Lake Huron? It wasn't until DWSD issued a termination notice that caused the city to consider relying on the Flint River in the interim because they could not agree on a contract extension with Detroit.

April 2014: Flint terminates service from DWSD and begins using their water treatment plant full time.

What approvals from DEQ were required to do this?

Because Flint had long ago been issued construction permits for raw water pumps to withdraw water from the Flint River, the city was grandfathered under the Water Withdrawal program as were all existing community public water systems. There were no additional DEQ permissions required.

Under Act 399, Michigan's Safe Drinking Water Act, there are no licenses or permit required to operate. Two construction permits were issues prior to the treatment plant changing from an emergency back-up plant to a full time operation. These permits were for small changes such as new chemical feed equipment, changes to the electrical service, etc.

Summer 2014: Flint experiences several (how many?) water main breaks and has 2 localized (describe) boil water events.

Do we mention the unusually harsh winter that led to an increased number of water main breaks throughout Michigan that year?

Is it unusual for a city to issue boil water advisories? Should the state have been concerned at this point?

During the summer, the city was actively repairing the distribution system. After the switch to the Flint River, it was discovered that there were (how many) broken or closed valves in the city's distribution system. As the city began correcting this problem they did experience issues of bacteria in the distribution system as a result of the repairs.

This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

Complaints are being made that there are taste, odor, and color issues since the switch from DWSD; including rashes and hair falling out. Why didn't the state do something?

DEQ consulted with the city regarding these complaints. The city indicated that they were offering testing for anyone that had issues and that they were not able to verify the complaints. Jugs of discolored water were being brought to meetings, but city personnel were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHM's, it was anticipated that there would be short term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) can and will cause temporary problems as described. Based on information from the city personnel, it appeared that the complaints were related to operational activities occurring in the distribution system.

Late Summer 2014: Monitoring for TTHM's in the distribution system identifies that the city has elevated levels and will violate the MCL for TTHM's in subsequent monitoring.

How was this handled? Should this have been a sign that it was a mistake to "allow" Flint to switch from DWSD to the Flint River?

Because the water treatment plant was originally upgraded for intermittent, emergency use, it was not possible to predict Disinfection Byproduct formation until the city began relying on it continuously. The Flint River had higher levels of organic material and it was not a surprise that the water produced by the city of Flint developed higher disinfection by-products. TTHMs and HAA5s are the result of organic material in the water reacting with the disinfectant. On more than one occasion, DEQ district supervisors and engineers have indicated that continuous use of the Flint River poses an increased microbial risk and an increased risk of disinfection byproducts; will trigger additional regulatory requirements for monitoring; and require significant enhancements at the Flint Water Treatment Plant.

In preparation to rely on the Flint River, the city installed ozone to help reduce the organic material (known as precursors), but additional measures were necessary. Because TTHM and HAA5 MCLs are calculated based on a running annual average at a specific location, the city didn't actually violate the safe drinking water act standard until the fall, but because it was apparent in the summer of 2014 that the standard would eventually be exceeded, the city was asked to proactively implement measures to address the problem before the violation required them to do so. The city added granular activated carbon to their filters (after receiving a construction permit from DEQ on date?) and levels of TTHMs and HAA5s were reduced. The city returned to compliance with the running annual average (MCL) on (date?).

What is the role of DEQ as a regulatory agency implementing the Michigan Safe Drinking Water Act?

What is the role of the City of Flint in water system operation and providing safe drinking water?

Issues around lead/copper:

Why didn't DEQ require a corrosion control plan from the city prior to bringing the water treatment plant on-line in April 2014?

DEQ believed there were two ways under the lead/copper rule to deem a water supply as providing "optimal corrosion control" – either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment. DEQ staff thought it was appropriate to call for the city of Flint to perform two 6-month rounds of monitoring to demonstrate if the city was practicing optimal corrosion control treatment. According to state regulations (R325.604f (2) (iii), a system can demonstrate that it is "practicing optimal corrosion control" by sampling in two, consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the Flint River has 0 ppb lead, the city would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods.

In addition, the city of Flint had been purchasing water from DWSD that was treated for corrosion control. It was DWSD that was considered as having optimized corrosion control at that point. Since the city of Flint had not been the supplier of water before, DEQ did not require the city to "maintain" corrosion control for which it was not responsible. It couldn't "maintain" something that it wasn't doing. As we stated previously, we believed Flint should have been afforded the same opportunity that all other large water systems were initially granted to demonstrate optimal corrosion control treatment through full scale monitoring. For these reasons, two 6-month rounds of monitoring, as required by the lead/copper rule were felt to be appropriate to determine whether or not optimal corrosion control was being achieved.

The first round of monitoring conducted July 2014 through December 2014 resulted in a 90th percentile of 6 ppb lead. Why didn't the DEQ require the city take actions at this point?

A 90th percentile lead/copper result of 6 ppb for lead is not unusual. Many water supplies in Michigan and across the country have 90th percentile levels of lead greater than this. Even systems that have installed treatment and are considered optimized by definition can and do have levels above 5 ppb.

In February, EPA staff inquired about corrosion control and whether the city was providing treatment to control corrosion. What was the DEQ's response?

DEQ indicated that they city was in compliance with the lead/copper rule. 90th percentile levels were below the Action Level and not unusual. The city was already conducting the second round of monitoring which would provide for a determination of whether or not additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the lead/copper rule that

lead or copper results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile action level in the rule.

An e-mail from Steve Busch indicated that the city was practicing corrosion control. Why was this said?

This was a misstatement. What was meant was that the city was performing the required monitoring to determine whether or not they were "practicing optimal corrosion control". It was clarified in follow-up telephone conversations with EPA.

In April, EPA staff visited Flint and sampled a residence at 212 Browning. High levels of lead were present. Why wasn't this seen as a potential system-wide problem?

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The reason for this connection is unknown. The city replaced the lead service line. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem. There was also no reason to believe that this matter was anything other than a site specific condition. (may not be so unique in terms of Pb levels)

A draft memo, dated June 24, 2015, from an EPA staff person claimed that DEQ had inappropriately handled the sampling at the city and that corrosion control should have been required before start up. What is DEQ's response to these allegations?

DEQ never received this memo and it is our understanding that EPA never sent us this memo. A copy of the draft document was downloaded from the ACLU website. On June 30th, an e-mail was received from EPA that indicated it was a draft memo that had been shared with the homeowner where sampling occurred and that once management had a chance to review the memo they would provide a final copy to DEQ. A final copy was never received. Also, EPA indicated in this same e-mail that a conference call to discuss the issues raised in the memo was scheduled for July 21st between the agencies.

During the July 21st call, EPA provided a rule citation (for the first time) indicating that ..... DEQ provided their interpretation of the lead/copper rule. EPA indicated that they would consult with their attorneys and seek a clarification regarding the two different interpretations. To date (October 20th), DEQ has not received any feedback from EPA regarding the state's interpretation.

There is on-going criticism that the DEQ provides inappropriate guidance to water supplies regarding pre-flushing of taps prior to lead/copper sampling? Explain DEQ's rationale for doing this.

The lead/copper sampling protocol is designed to standardize sample collection and is not the same protocol that would be used for an exposure assessment. Different sampling is done for different purposes.

Under the lead/copper rule, samples collected must be "first-draw' 1 liter samples collected from kitchen or bathroom taps at EPA designated, high-risk locations after

overnight stagnation. It is recognized that this may or may not be the highest level of lead that could be found at a residence. However, it does provide the water supplier with information about efficacy of their treatment process and an indication of how the water may be reacting with plumbing in the system.

The lead/copper rule is the only rule that requires compliance monitoring to be performed by homeowners. In order to simplify the instructions and ensure consistent sampling protocol and results, DEQ recommends that a sample tap/outlet be run the night before it is going to be sampled so that the sampling location is representative of a tap experiencing typical household use (as required by the lead/copper rule). Historically, there were problems with homeowners sampling from locations that had not been used for days, weeks or even months. The recommended/required stagnation period under the lead/copper rule is 6 to 18 hours. To accomplish this across the board, DEQ policy is to recommend that the tap be used or use be simulated on the night before it is going to be sampled. EPA has incorporated similar sampling protocols into tap sampling programs at schools and day care centers. (do we want to provide a footnote with a citation to the Milwaukee Westlawn CARE Project?)

If there is a lead service line in the house, then a first draw sample under this condition will not contain water that has sat stagnant for some time in that service line. However, flushing the tap the night before will not likely result in capturing a first draw sample that has sat stagnant in that lead service line because only the tap that is going to be sampled is required to be stagnant. If there is a toilet or a dishwasher nearby, they can still be used. And it is impossible to predict whether there is water in that particular line that has spent any time at all resting quietly for any period of time in the service line and only happens to be poised for withdrawal at that particular tap at that particular moment. Only a site specific evaluation of a household plumbing system along with a site specific calculation of the volume of water in the plumbing system and the volume of water in the lead service line would potentially provide for a sample that has rested in the service line assuming that no water has been used in the house during the entire time of "resting". This level of complexity is not a practical approach for a community to employ or for water systems across the country to accomplish when they must rely upon homeowners to collect samples. The lead/copper rule is imperfect. But the instructions provided by DEQ provide for a consistent sampling protocol that is easily followed by homeowners and results in samples collected that meet the legal requirements of the lead/copper rule and the intention of providing water quality information upon which further regulatory decisions should be made. The lead/copper rule is intended to assist water suppliers with evaluating their treatment process and the effects of the water on plumbing systems. It is not a tool to assess individual exposure.

After the July 21st call with EPA where they provided a regulatory citation and their opinion that the DEQ had not followed the required protocol to require treatment, what steps were taken by DEQ to address the situation?

By the time the July 21st call occurred, the city had completed their two 6-month rounds of lead/copper monitoring. This monitoring showed that the city needed to install corrosion control measures. On August 17th, the DEQ wrote the city requiring the city to perform a study and install corrosion control treatment in accordance with the safe drinking water act. We also recommended Flint significantly accelerate this action and not take the time allotted by the regulations for selecting and installing OCCT.

When DEQ met with city residents on August 4th, they were still saying that the water was safe even after the sampling was done and it showed that corrosion control was necessary. Why the contradiction?

At the time of this meeting, all sampling results to date indicated that lead levels were within typical ranges seen in other water systems and below the Action Level established in the rule. It was acknowledged that the results showed that the city of Flint needed to provide optimal corrosion control treatment and that would soon be required. In addition, data provided by our colleagues at the Department of Health and Human Services indicated that there was no significant change in children's blood lead levels within the city. The evaluation showed that blood lead levels were following historical seasonal patterns and there was no indication of a water contributing to an increase. This provided backup confirmation (at that time) that the path followed was correct.

When the V-T researcher raised the alarm on (date) that the sampling required by DEQ was wrong and that levels of lead in the city were much higher than previously thought, why didn't DEQ investigate these claims and follow up on this information?

DEQ was informed in late August that a study was underway in the city and that samples taken appeared to be much higher than those taken under the lead/copper rule. Since we were not provided information regarding protocol used for the study, the DEQ could not adequately comment on the comparison between the two data sets. It was not however, unexpected that a different sampling protocol could yield higher results. Since the required two 6-month rounds of monitoring had already been completed at this point and the city had been notified of the requirement to install treatment, there were no additional actions deemed necessary by the agency at this point. The city had not exceeded the lead action level, they were actively pursuing treatment on an accelerated schedule, and DHHS information regarding blood lead levels in the city indicated that there was NO significant change since the switch.

Why did DEQ change their position in September and agree that lead is a problem in Flint?

As soon as the DHHS Chief Medical Officer determined that there was a correlation between blood lead levels in children in certain zip codes and the switch to the Flint River, DEQ responded. Actions were taken within a week to address the concerns raised.

Why is DEQ admitting it made a mistake?

If EPA's interpretation is correct and the city of Flint was required to maintain corrosion control and should not have been allowed to switch sources without maintaining corrosion control, this wasn't done. All indications are that the protective coating that was in place as a result of treated water received from DWSD has been eroded and that lead leaching has increased during the time that there hasn't been treatment. This was the mistake. However, DEQ staff acted in good faith. They believed that they were implementing the lead/copper rule appropriately with all of its nuances in sampling and limitation on compliance monitoring. The lead/copper rule establishes a mechanism for a new supply (when not previously serving water to the public) to conduct two 6-month rounds of monitoring to determine whether or not the supply can be deemed optimal by definition or whether treatment must be installed. It did not anticipate a system serving

greater than 50,000 residents would disconnect from a regional supply to become its own supply with a new source and different treatment methods. It was these circumstances for which DEQ employees were sincerely applying regulations as they interpreted them to ensure compliance and public health protection.

Why was Flint required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of the Michigan Safe Drinking Water Act (Act 399, PA 1976, as amended).

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples Flint was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census (*check with Steve*), which listed the city's population as more 100,000 residents. In March of 2015, the city provided an updated census that indicated the city's population had decreased to less than 100,000 (*check with Steve*). Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

Why were some sample results submitted by the City of Flint during the latest monitoring period excluded from the 90th percentile compliance calculation?

Compliance samples must be 1 liter in volume and be a first draw, 1 liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted sampling sites, called tier 1 sampling sites. For a municipality such as the City of Flint, the tier 1 sampling pool must consist of single family structures that are:

- served by a lead service line,
- contain lead pipes, or
- contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

Furthermore, if a community has tier 1 sites that contain lead services, they are required to have at least 50% of their compliance samples collected from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters,

etc. One of the samples submitted by Flint that was excluded from the 90th percentile compliance calculation in the latest monitoring period was taken from a tap at a non-residential site, and the other sample result that was removed was collected from a single family home that has point of use treatment (*check with Steve*). Both of these sites are therefore statutorily excluded from the compliance consideration. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point of use or point of entry treatment can only be used if the community has insufficient tier 1 sites available.

Although we already addressed the issue of why we did what we did in the first question after the "Issues around lead/copper," the following citation and explanation may be useful if needed to answer additional questions or ones we haven't yet asked:

Rule 325.l1064(f) (2) (D) (iii) says, "A water supply is considered to have optimized corrosion control if it submits results of tap water monitoring conducted under R 325.10710a and source water monitoring conducted under R 325.10710c that demonstrates, for 2 consecutive 6-month monitoring periods, that the difference between the ninetieth percentile tap water lead level computed under subrule (1)(c0) of the rule and the highest source water lead concentration is less than the practical quantification level (PQL) for lead. *(This is the procedure we were applying to Flint as they became a supplier and not just a consecutive system receiving finished water)* In addition, all of the following provisions apply:

(A) A supply whose highest source water lead level is below the method detection limit is considered to have optimized corrosion control under this paragraph if the supply's ninetieth percentile tap water lead level is less than or equal to the PQL for lead (which is 5 ppb) for 2 consecutive 6-month monitoring periods.

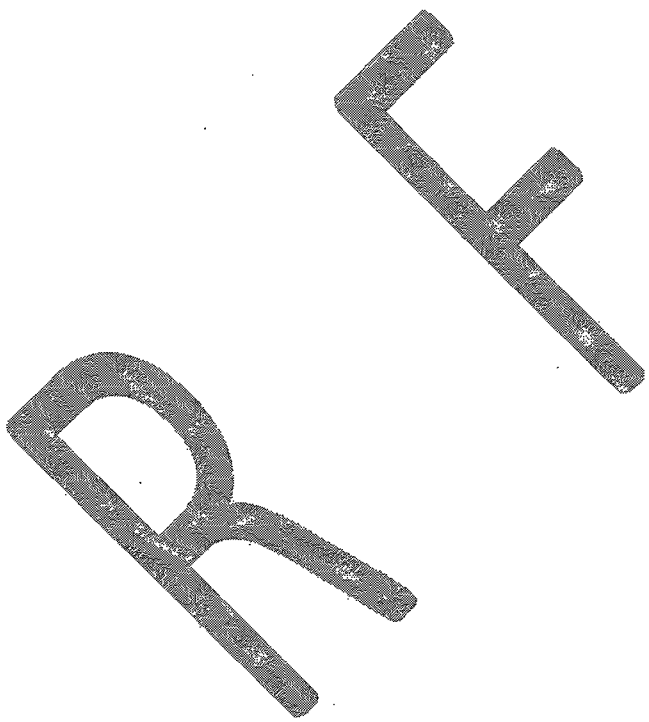
(B) A water supply considered to have optimized corrosion control under this paragraph shall continue monitoring for lead and copper at the tap not less frequently than once every 3 calendar years using the reduced number of sites specified in R 325.10710a(3) and collecting the samples at times and locations specified in R325.10710a(4)(d)(iv).

(C) A water supply is considered to have optimized corrosion control under this subdivision shall notify the department, in writing, under R325.10710d(a)(iii) of an upcoming long-term change in treatment or addition of a new source as described in that subdivision. The department shall review and approve the addition of a new source or long-term change in water treatment before it is implemented by the water supply. The department may require the supply to conduct additional monitoring or to take other action the department considers appropriate consistent with the requirements of R325.10604f(2) to ensure the supply maintains minimal levels of corrosion in the distribution system.

(D) & (E).....(lots more but not germane to the discussion)

Subparagraph (C) raises the issue of why Flint's change in source and treatment did not trigger additional department actions. One explanation has to do with whether the City of Flint was *"considered to have optimized corrosion control."* ODWMA staff did not consider Flint or any of the almost 300 other consecutive, customer water systems in Michigan that only receive and distribute finished water to be responsible for corrosion control treatment. It has been our practice to consider treatment of water to be the responsibility of the wholesale supplier, in this case DWSD. Therefore, this rule was not

considered applicable. Another explanation is that Flint already had authority to use the Flint River based on historic permits and periodic emergency use, so the city was not required to seek DEQ approval for a "new" source. And like every other large water system that initially came under the jurisdiction of the lead and copper rules, we were applying the overall procedure described in the above paragraph above subparagraphs (A) through (E) that allowed a system to demonstrate whether their current treatment methods were already deemed optimal. When the LCR was first implemented, numerous systems exceeded the lead action level of 15 ppb and wholesale suppliers had to optimize the corrosion control treatment. Under the regulatory framework allowed, some systems went 4 or more years before they had optimized their corrosion control, and in some cases, it took longer for it to take full effect in all of the consecutive customer supplies.



City of Flint Drinking Water
Outline prepared by the
Michigan Department of Environmental Quality for the
Flint Water Task Force

I. INTRODUCTION

This document is intended to provide an overview of Michigan's implementation of the Safe Drinking Water Act, 1976 PA 399, as amended (Act 399), with respect to events in the city of Flint (City), Michigan.

II. BACKGROUND

1. How has Flint historically obtained its drinking water?

The water system in the City was organized and built under private ownership in 1883 as the Flint Water Works Company to pump raw water from the Flint River to their consumers. In 1903, the system was converted to a municipally-owned corporation which supplied drinking water to the City. In 1967, the City switched and became a customer of the Detroit Water and Sewerage Department (DWSD) system.

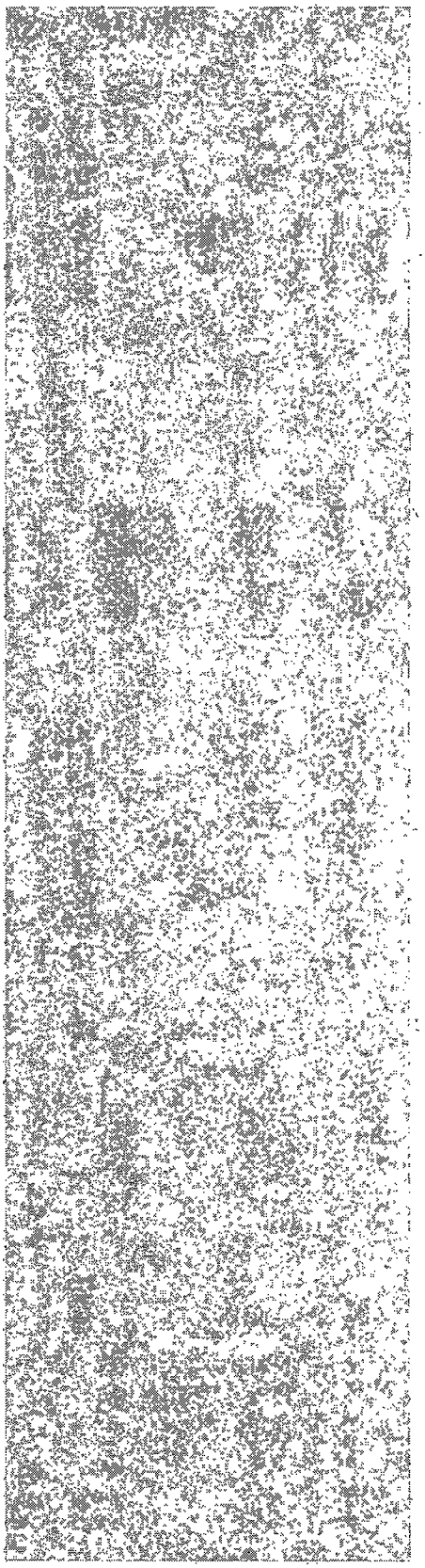
After the switch to DWSD, the City operated their water treatment plant as a standby plant for purposes of reliability in the event of an emergency such as an interruption in service via the single pipeline from DWSD.

During 2009, the water treatment plant was used in an emergency capacity in two instances: June 18 through June 20 and September 10 through September 13. Additionally, as a backup emergency plant, the City was required to operate the plant quarterly to demonstrate the capability to produce safe water in accordance with Act 399 and to keep mechanical equipment (such as valves, rubber seals, etc.) in good working order. Each quarter, the plant was test run and samples were taken of both raw water and of finished water (post-filters). Monitoring showed that the WTP was performing as designed. However, as a result of contractual obligations with DWSD, this treated water was not put into the City's distribution system during these test runs, but rather was discharged to the river in accordance with a National Pollutant Discharge Elimination System (NPDES) Permit. The test runs were for demonstration purposes, to keep the plant operational, and staff familiar with operation in the event it was needed in an emergency.

2. What State and Federal laws or rules exist to ensure safe drinking water is provided to City residents?

The federal Safe Drinking Water Act (federal SDWA) is the primary law that ensures the quality of Americans' drinking water. Under the federal SDWA, the United States Environmental Protection Agency (USEPA) sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.

The federal SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and



1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. (The federal SDWA does not regulate private wells which serve fewer than 25 individuals.)

Originally, the federal SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

The most direct oversight of water systems is conducted by state drinking water programs. States can apply to the USEPA for "primacy," the authority to implement the federal SDWA within their jurisdictions, if they will adopt standards at least as stringent as the USEPA's and enforce those standards. Michigan adopted the Safe Drinking Water Act in 1976 through Act 399 and has maintained primacy for the program since that time.

3. **What is the USEPA's role as a regulatory agency in implementing the SDWA?**

Federal and state governments share responsibility for administering drinking water programs. Under the federal SDWA, the USEPA is given the responsibility for developing national standards and regulations that apply to the nation's public drinking water systems and enforcing those standards, by working with states.

Michigan's drinking water program is audited annually by the USEPA for compliance with the federal SDWA. Based upon these audits, the USEPA continues to find Michigan's drinking water program to be compliant with the federal SDWA.

4. **What is the Michigan Department of Environmental Quality's (DEQ) role as a regulatory agency in implementing the SDWA?**

The federal SDWA permits states to accept oversight of the drinking water program under an agreement with the USEPA giving states primary enforcement responsibilities (or primacy). In addition to this delegation of federal authority to the states, states also have the power to create additional regulations and programs governing drinking water suppliers through their own legislative and regulatory processes. Michigan has had regulatory authority providing oversight of public water supplies since 1913 (Waterworks and Sewerage Systems, Act 98 of 1913).

The DEQ has been granted primary enforcement authority in Michigan for the federal SDWA under the statutory authority of Act 399. As such, the DEQ, Office of Drinking Water and Municipal Assistance (ODWMA) has regulatory oversight for all public water supplies, including approximately 1,425 community water supplies and 10,000 noncommunity water supplies. A community water supply provides year-round service to 15 or more living units or 25 or more residents. A noncommunity water supply has 15 or more service connections or serves 25 or more individuals on an average daily basis for not less than 60 days per year.

The DEQ engages in a variety of activities to help water systems remain in, or return to, compliance. These activities include: conducting surveillance visits at water systems and reviewing their facilities, equipment, and operations; requiring the submission of plans and specifications for waterworks system improvements and issuing construction permits; providing for the training, examination, certification and regulation of persons operating water supplies; helping systems invest in preventive measures; and since 1996, providing financial assistance for system improvements.

5. **What is the City's role in implementing the federal SDWA?**

State and federal programs develop regulations and perform oversight and compliance activities, but do not treat or deliver water to customers. At the local level, public and private water utilities collect, treat, and deliver drinking water to consumers in compliance with state and federal regulations.

To ensure that drinking water is safe, the federal SDWA sets up multiple barriers against pollution. These barriers include: source water protection, multiple treatment components, distribution system integrity, proper operations oversight, and public information. As a public water system, the City is responsible for ensuring proper design, construction, operations and maintenance, so that contaminants in tap water do not exceed the standards established by law. The City treats the water, and must test their water frequently for specified contaminants and report the results to the DEQ. If a water system is not meeting these standards, it is the water supplier's responsibility to notify its customers.

The federal SDWA recognizes that customers have the right to know what is in their drinking water and where it comes from. The City, like all water suppliers, must notify consumers quickly when there is a serious problem with water quality. Water systems serving the same people year-round must provide annual consumer confidence reports (CCR) on the source and quality of their tap water.

The City submits samples of their water for laboratory testing (monitoring) to verify the water they provide to residents meets all federal and state standards. How often and where samples are taken varies from system to system and from contaminant to contaminant. The DEQ provides an annual monitoring schedule to the City setting forth these requirements.

In addition, the City is required to employ properly, certified water operators that are trained and experienced to operate the treatment and distribution system associated with the City's water system.

III. THE FLINT RIVER – IS IT A SAFE SOURCE OF DRINKING WATER?

In Michigan, we are fortunate to have high quality drinking water sources. Seventy percent of Michigan's population receives its drinking water from surface water sources, the majority of which is withdrawn from the Great Lakes. A handful of public water supplies in Michigan do treat water from inland rivers, lakes or groundwater under the influence of

surface water. All surface water sources and groundwater under the influence of surface water requires significant treatment in order to be safe for consumption. Treatment of surface water is referred to under Act 399 as "complete treatment."

While all surface water sources must receive this higher level of treatment, river sources present a greater challenge than water withdrawn from one of the Great Lakes. River sources are more challenging to treat because of how rapidly water quality may change compared to Great Lakes Sources. Under most circumstances, rivers are also prone to greater fluctuations in temperature, have higher amounts of organic material, greater turbidity (suspended solids), and are more vulnerable to microbiological and viral contamination than Lakes Huron, Erie, Michigan or Superior. It should be noted, that while the water chemistry in the Flint River differs from that in Lake Huron, it can still be treated in accordance with the federal SDWA and Act 399. Many cities across the country rely on similar sources for drinking water. The waterworks industry has the technology to treat wide ranging source waters to provide potable and palatable drinking water, including direct reuse of wastewater. Regardless of source water quality, all public water systems must comply with the same drinking water standards in the finished water.

Also, it is not the source water that reacts with the homeowners plumbing out in the distribution system, but rather the finished water quality that is important. To begin with, neither the Flint River nor the treated water leaving the City's WTP contains lead. In addition, the treatment process employed by the City includes lime softening to reduce the hardness in the river water. Lime softening is not a process that would typically be thought to increase corrosivity of water. The City, however, does practice recarbonation to readjust pH at the end of the softening process. pH levels of finished water leaving the City's WTP averaged 7.7. Water monitoring conducted quarterly at 25 sample sites located throughout the distribution system showed the following:

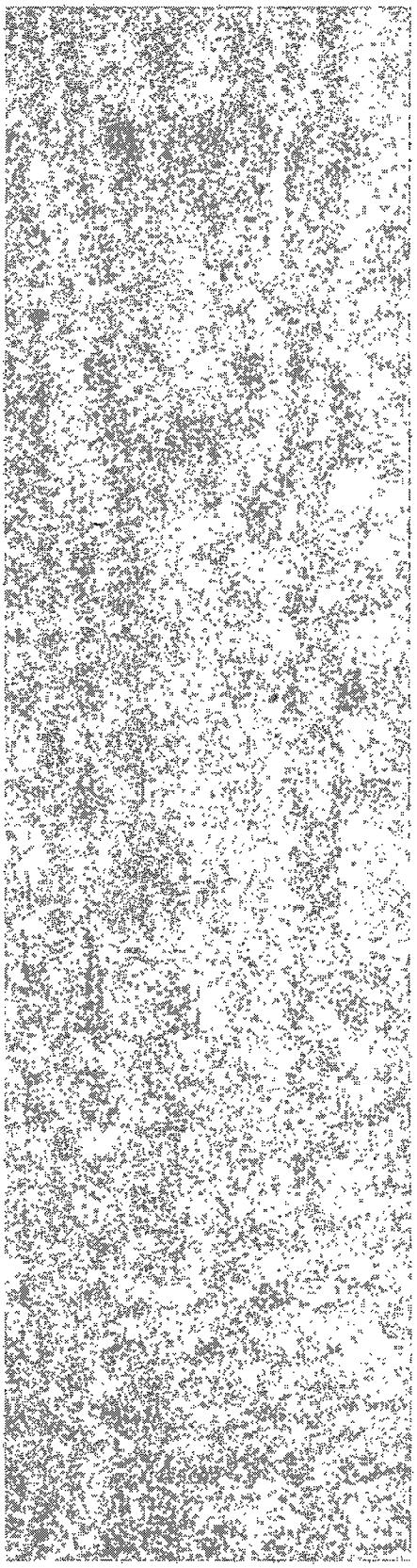
July – September 2014	average pH = 7.71	range: 7.56 – 7.86
October – December 2014	average pH = 7.88	range: 7.62 – 8.10
January – March 2015	average pH = 7.81	range: 7.60 – 7.99
April – June 2015	average pH = 7.63	range: 7.48 – 7.80

The following data was obtained at the same sampling locations throughout the City's distribution system, but while they were still purchasing water from DWSD before the City switched to the River as a source:

January – March 2014 (DWSD)	average pH = 7.47	range: 7.40 – 7.54
April 2014 (DWSD)	average pH = 7.49	range: 7.42 – 7.59

Note that the pH numbers while the City was treating the Flint River did not differ significantly from those produced by DWSD, and in fact, water produced while using the Flint River tended to be slightly higher (less corrosive).

IV. *E. COLI* AND TOTAL COLIFORM BACTERIA VIOLATIONS



1. **What caused the *E.Coli* and total coliform bacteria violations experienced by the City in August and September 2014?**

   A number of factors, not one specific cause, likely contributed to the Boil Water Advisories (BWAs) in the City during August and September 2014 triggered by exceedances of bacteria standards in limited areas of the distribution system. While the Flint River has higher levels of natural organic matter than typically found in the Great Lakes, Flint's water treatment plant (WTP) performed well above requirements for removal of organic carbon. In addition, the coliform detections were confined to less than 20 percent of the water system. If treatment had been compromised, detections would have been expected throughout the City rather than in such a limited geographic area.

   Instead, the violations seem to have been caused by other factors such as aging infrastructure and unusual weather patterns. The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of unlined cast iron piping. This cast iron pipe is subject to internal corrosion, called tuberculation, which thins and weakens the pipe walls in some areas and causes a buildup of sediment and debris on the pipe walls in other areas. Tuberculation can lead to water quality issues as well as reduced flows and pressures. Tuberculation also encourages the development of biofilms, or layers of bacteria that attach to the rough surfaces of interior pipe walls. Biofilm growth is common in areas where little or no disinfectant residual is maintained.

   The City has also experienced decades of a declining customer base and water use, with vacant homes, commercial businesses and industrial property. Declining water use leads to excess residence time (stagnation) within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and loss of disinfectant residual. While the City has recently seen an infusion of funding for blight removal, contractors completing this work have been known to improperly use fire hydrants, causing hydraulic disturbances that dislodged and suspended settled debris, which may have contributed to the bacterial contamination. These hydraulic disturbances were also believed to be the source of the aesthetic water quality complaints both the city and DEQ were receiving.

   The winter of 2013/2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30 percent, saw even greater losses since February of that year due to an increase in cold weather related water main breaks and leaks (City personnel reported 400 water main breaks in calendar year 2014, with greater than 50 percent in the winter quarter). The City has also been lacking a formal maintenance program for its more than 7,250 valves, which are critical in limiting the areas impacted during water main repairs. As an example, two valves on the transmission line used to supply the area of the 2014 BWAs were found to be closed during the City's investigation of possible sources, causing much longer residence times, reduced disinfectant residuals, and reduced pressures – all potential avenues for contamination to enter a distribution system.

   The BWAs also occurred during the warmest and relatively wet periods of August and September 2014. Warm weather conditions are not only more conducive to bacterial

growth but also degrade disinfectant residuals more quickly. As already explained, longer residence times, biofilms, and tuberculation contribute to disinfectant residual degradation. Warm, wet weather conditions also allow water contaminated with bacteria to accumulate or pond around piping that leaks and breaks.

During the summer of 2014, the city was actively repairing the distribution system (City personnel reported 29 water main breaks in June through August 2014). After the switch to the Flint River, it was discovered that there were many broken or closed valves in the distribution system (City personnel reported 120 broken valves and 239 valves in an improper position). As the city began correcting this problem they did detect the presence of coliform organisms in the distribution system in the testing conducted as a result of the repairs. This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

2. How were the violations detected? What was the DEQ's response?

Federal SDWA Regulations regarding monitoring and standards for bacteria in water distribution systems are incorporated into Act 399. There are a variety of bacteria, parasites, and viruses which can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, water systems are required to test for total coliform and *E.coli*. Total coliform bacteria, while not pathogenic, often originate from the same sources as many pathogens. Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system indicates a minimal likelihood that pathogens are present. *E.Coli* is itself a pathogen and its detection is considered direct evidence of a health risk.

The BWAs which occurred in the City were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the City collaboratively in consultation with the DEQ.

Once a BWA has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Using the most common analytical method, samples must be incubated for 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a BWA. Adding each of these steps together, a normal response period to rescind a BWA under these circumstances would be expected to take 3 to 4 days.

Upon receiving information indicating total coliform and *E. Coli* bacteria had been detected, DEQ advised the City to issue a BWA from August 15 through 20, 2014, for the affected portion of the City. Another BWA was issued from September 5 through 9, 2014, due to localized detections of total coliform bacteria in the same and adjacent portions of the City.

The advisory covered an area approximately 6 square miles or less than 20 percent of the water department's service area of just over 34 square miles.

No total coliform or *E. Coli* bacteria detections have been reported in the City since September 2014.

V. TOTAL TRIHALOMETHANES (TTHM) VIOLATIONS

1. What caused the TTHM violations experienced by the City beginning in late summer 2014?

Disinfectants are an essential element of drinking water treatment because of the barrier they provide against waterborne disease-causing microorganisms. However, disinfection byproducts (DBPs) form when disinfectants used to treat drinking water react with naturally occurring materials in the water (e.g., decomposing plant material). A major challenge for water suppliers is how to control and limit the risks from pathogens and disinfection byproducts. It is important to provide protection from pathogens while simultaneously minimizing health risks to the population from disinfection byproducts.Total Trihalomethanes (TTHM – chloroform, bromoform, bromodichloromethane, and dibromochloromethane) and halogenated acetic acids (HAA5 – monochloro-, dichloro-, trichloro-, monobromo-, dibromo-) are widely occurring classes of DBPs. The amount of TTHM and HAA5 in drinking water from one water system can change from day to day, depending on the season, water temperature, amount of chlorine added, the amount of plant material in the water, and a variety of other factors. All community water systems that chemically disinfect or purchase water that has been chemically disinfected are required to monitor for DBPs.

The Flint River has higher levels of organic material than water in the Great Lakes and as a result the water produced by the City developed higher DBPs than the water provided by DWSD. However, because the WTP was previously operating intermittently as an emergency backup supply with water being wasted rather than entering the distribution system, it was not possible to predict DBP formation until the City began relying on it continuously.

As mentioned previously, the City became aware that there were numerous broken valves and closed valves that should have been open in the distribution system. At this time, the City also began a mapping effort to identify "water age" in the distribution system. The longer the residence time or "water age" the greater the opportunity for the formation of DBPs.

2. How were the violations detected? What was the DEQ's response?

In preparing to rely on the Flint River, the City installed an ozone treatment system to help reduce the organic material (known as precursors), but additional measures were necessary. Because TTHM and HAA5 maximum contaminant levels (MCLs) are calculated based on a running annual average at specific distribution system locations, the actual violation of the federal SDWA standard did not occur until the fall of 2014. However, it was apparent in the

summer of 2014 that the standard would eventually be exceeded; the DEQ asked the City to proactively implement measures to address the problem before the violation required them to do so.

As a result of maintenance efforts undertaken by the City to repair valves and correct improperly closed valves; the City was able to improve hydraulic characteristics of the distribution system and thereby reduce residence time or "water age" in the system. Operational changes made to reduce the amount of storage in the system also helped reduce residence time which contributed to a reduction in DBP formation.

In addition to operational changes to minimize residence time in the distribution system, the City added granular activated carbon to their filters after receiving a construction permit from the DEQ on July 14, 2015. Levels of TTHMs and HAA5s were reduced and the City returned to compliance with the running annual average (MCL) on September 1, 2015.

VI. THE TASTE, ODOR, AND COLOR COMPLAINTS RECEIVED BY FLINT

1. What caused the taste, odor and color complaints received by the City from residents?

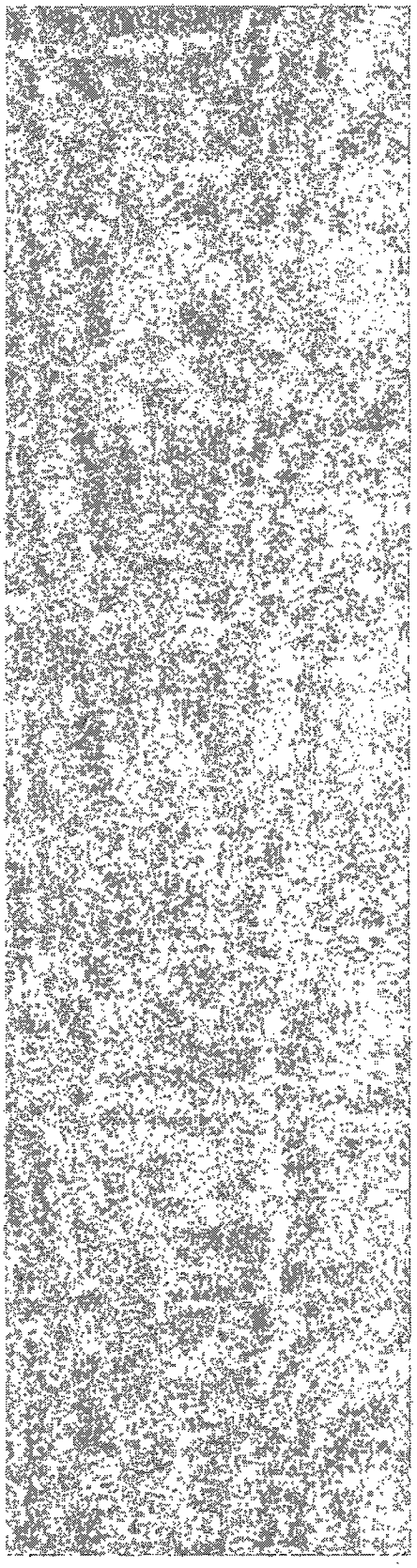
Taste, odor and color issues are very personalized. In the City, during the summer after the switch to the Flint River as a water source, taste, odor, and color complaints increased. At the time, increases in color, odor and changes in taste appear to occur because of changes in hydraulic conditions within the distribution system. Water leaving the WTP did not have any unusual odor or color. However, construction in the distribution system, hydrant flushing, and changes in flow characteristics are all known causes of disturbances with the distribution system that can cause an increase in taste, odor and color. Aesthetics, such as taste, odor, and color, while a concern, by themselves are not a threat to public health.

2. What was the DEQ's response?

The DEQ consulted with the City regarding these complaints. The City indicated that they were offering testing for anyone that had issues and that they were not able to verify the complaints. Jugs of discolored water were being brought to meetings, but City personnel informed the DEQ that they were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHMs, it was anticipated that there would be short term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) often causes temporary problems as described. Based on information from City personnel, it appeared that the complaints were related to such operational activities occurring in the distribution system.

VII. LEAD ISSUES IN THE FLINT DRINKING WATER

1. What causes lead in drinking water?



Lead is rarely found in source water. Lead enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead fixtures, and solder. Older homes built prior to World War II, are more likely to contain lead pipes. The most common problem with newer construction is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially hot water. The amount of lead in tap water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the pH of the water, and its temperature.

2. Are there any safe levels of lead?

The federal SDWA requires the USEPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. These non-enforceable health goals, based solely on possible health risks are called maximum contaminant level goals (MCLGs). The MCLG for lead is zero. The USEPA has set this level based on the best available science which shows there is no safe level of exposure to lead.

3. What is the Lead and Copper Rule?

Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. On June 7, 1991, the USEPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR).

The treatment technique for the rule requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 15 ppb or copper concentrations exceed an action level of 1.3 parts per million (ppm) in more than 10 percent of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the AL for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control.

4. What is the lead action level (AL)?

For most contaminants, the USEPA sets an enforceable regulation called an maximum contaminant level (MCL) based on the MCL Goal (MCLG). MCLs are set as close to the MCLGs as possible, considering cost, benefits, and the ability of public water systems to detect and remove contaminants at the WTP using suitable treatment technologies. However, because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, the USEPA established a treatment technique rather than an MCL for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to control a contaminant. The treatment technique regulation for lead (referred to as the Lead and Copper Rule) requires water systems that produce drinking water to control the corrosivity of the water. The regulation also requires systems to collect customer tap samples from sites served by the system that are more likely to have plumbing materials

containing lead. If more than 10 percent of a system's tap water samples exceed the lead AL of 15 parts per billion (ppb), then water systems are required to take additional actions including:

•Optimizing their corrosion control treatment (for water systems serving 50,000 people that have not fully optimized their corrosion control).

•Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.

•Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

5. Did DWSD have a corrosion control plan?

After the LCR passed in 1991, DWSD and all of their consecutive customer systems conducted two rounds of monitoring for lead and copper. Copper levels were well below AL limits, but lead levels exceeded the AL of 15 ppb in Detroit and many of their customer communities. As a result, DWSD installed corrosion control treatment. DWSD performed a corrosion control study and concluded that they could reduce the corrosivity of the water by the addition of an orthophosphate.

6. Did the DEQ require the City to have a corrosion control plan in place when it switched to the Flint River as its source of drinking water?

No. There are two ways under the LCR to deem a water supply as providing "optimal corrosion control" – either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment if it is needed. The DEQ requested that the City perform two 6-month rounds of monitoring to demonstrate if the City was practicing optimal corrosion control treatment. According to state regulations (R325.604f (2) (iii), a system can demonstrate that it is "practicing optimal corrosion control" by sampling in two, consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the Flint River has 0 ppb lead, the City would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods.

In addition, the City had been purchasing water from DWSD that was treated for corrosion control. It was DWSD that was considered as having optimized corrosion control at that point. Since the City had not been the supplier of water before, the DEQ did not require the City to "maintain" corrosion control for which it was not responsible. It could not "maintain" operations undertaken elsewhere by a different entity for a different source of water. The DEQ's instructions to the City were consistent with its past practices and its belief that the City should have been afforded the same opportunity that all other large water systems were initially granted to demonstrate optimal corrosion control treatment through full-scale monitoring under the applicable rules. For these reasons, two 6-month

rounds of monitoring, as required by the LCR were the required means to determine whether or not optimal corrosion control was being achieved.

7. How does the DEQ calculate the 90th percentile?

To determine the 90th percentile of a list of lead or copper results, the procedure below is followed:

Step 1: Place lead or copper results in ascending order
Step 2: Assign each sample a number, 1 for lowest value
Step 3: Multiply the total number of samples by 0.9 – this yields the 90th percentile sample.
For example: 20 samples x 0.9 = 18th sample. This is the 90th percentile level.

Calculating the 90th percentile is easiest when a supply collects 10 samples (or a multiple of 10). Note that the 90th percentile must be interpolated if the number of samples is not a multiple of 10.

8. What was the result of the first round of monitoring conducted by the City?

The first 6-month round of lead and copper monitoring conducted by the City ended on December 31, 2014. One hundred samples were submitted and the 90th percentile lead level was calculated to be 6 ppb.

A 90th percentile lead result of 6 ppb is not unusual and did not approach the AL or cause alarm. Many water supplies in Michigan and across the country have 90th percentile levels of lead greater than this. Even systems that have installed treatment and are considered optimized by definition can and do have levels between 5 ppb and 15 ppb. For example, in 2014, the following communities had lead results as indicated: DWSD (2.3 ppb), Grand Rapids (2.2 ppb), Kalamazoo (13 ppb), Lansing Board of Water and Light (7.8 ppb), and Saginaw (8 ppb).

9. What was the result of the second round of monitoring conducted by Flint?

The second 6-month round of lead and copper monitoring conducted by the City ended on June 30, 2015. Sixty-nine samples that complied with the site selection criteria submitted and the 90th percentile lead level was calculated to be 11 ppb. The conclusion from these results was that the City, while in compliance with the AL, exceeded the level required to be deemed as having optimized corrosion control.

10. Why was the City required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of Act 399.

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples the City was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census, which listed the City's population as more than 100,000 residents. In March of 2015, the City provided updated information that indicated the City's population had decreased to less than 100,000. Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

11. What actions did the DEQ order the City to undertake after the second round of monitoring?

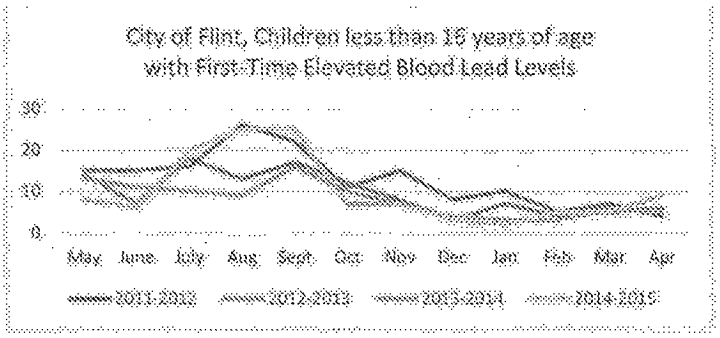
While the City's LCR compliance monitoring continued to meet AL requirements, the City exceeded the level required to be deemed as having optimized corrosion control. Following receipt of the City's compliance monitoring results, the DEQ required the City to install corrosion control treatment in correspondence dated August 17, 2015.

Under the LCR, the City has 6 months to let the DEQ know whether it intends to conduct a study, then 18 months to perform the study and make their recommendation, and 24 months to complete installation of the selected corrosion control. The DEQ requested the City to accelerate this schedule. The City submitted plans and specifications to install corrosion control treatment and a construction permit was issued by the DEQ on October 28, 2015. The City is in the process of installing the necessary equipment and procuring the appropriate chemicals. Treatment is expected to be on-line by the end of November 2015.

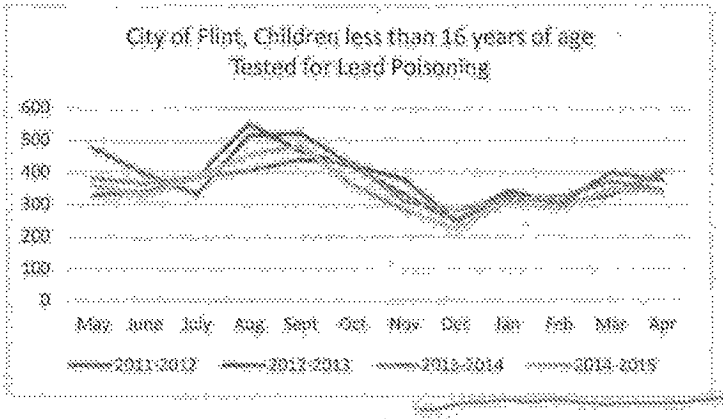
12. What had Department of Health and Human Services (DHHS) advised the DEQ regarding blood lead levels prior to the DEQ ordering the City to implement optimized corrosion control?

In an e-mail dated July 28, 2015, DHHS indicated that they "compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –

* Lead testing rates remained about the same from year-to-year (chart on the right).



- There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).



- However, that pattern was not terribly different from what we saw in the previous three years; especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).

- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspected that the summer data spike may be related to this effect.

- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015."

This e-mail from DHHS in concert with the completion of two 6-month rounds of lead compliance sampling data indicating that the City had not exceeded an AL for lead provided

the basis for the DEQ to maintain that the water in the City continued to be in compliance with the federal SDWA and was safe for consumption.

13. When did the DEQ first become aware of allegations of elevated blood levels being detected in certain children?

The DEQ was notified on August 23, 2015, by a professor from Virginia Tech that "over the next few months we will be studying Flint water quality issues..." and similarly notified by the USEPA on August 28, 2015. Results indicating elevated lead levels in homes were reported as part of this study in late August. In early September 2015, information was reported in news articles that pediatricians in the City had data suggesting an increase in children's blood lead levels in two zip codes in the Flint area.

By this time, the City had already completed the required two 6-month rounds of monitoring and a determination had been made by the DEQ that the City must install corrosion control treatment as documented in correspondence dated August 17, 2015.

VIII. QUESTIONS RAISED REGARDING THE DEQ'S ACTIONS

1. What was the DEQ's response to the USEPA's inquiry in February 2015 regarding the optimized corrosion control treatment being implemented by the City under the LCR?

The DEQ indicated that the City was in compliance with the LCR. 90th percentile levels were below the AL of 15 ppb and not unusual when compared to other large Michigan cities. The City was already conducting the second round of monitoring which would provide for a determination of whether additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the LCR that lead results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile AL in the LCR.

2. Did the DEQ attempt to mislead the USEPA in a February 27, 2015, e-mail responding to the USEPA's inquiry regarding Optimal Corrosion Control Treatment (OCCT)?

No. There is an e-mail from Steve Busch indicating that the City was practicing a corrosion control program. What was meant was that the City was performing the required monitoring to determine whether or not they were "practicing optimal corrosion control". The DEQ subsequently clarified its position in follow-up telephone conversations with the USEPA.

3. Has the USEPA subsequently admitted that the LCR is subject to differing interpretations such as that presented by the DEQ?

Yes. On November 3, 2015, the USEPA issued a Memorandum to all 50 states regarding the "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems". This memorandum addresses concerns raised about the application of the LCR, specifically the requirements pertaining to maintenance of OCCT, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. The USEPA states that this type of situation rarely arises, that

the language of the LCR does not specifically discuss such circumstances, and that there are differing possible interpretations of the LCR with respect to how the rule's OCCT procedures apply to this situation. The memo is intended to clarify prospectively steps agencies should take or apply in the future. By admitting that the LCR is subject to differing interpretations, the DEQ believes its interpretation and application of the LCR has been validated.

4. Did the DEQ reject any of the samples submitted by the City?

Yes, samples at two locations were excluded from the compliance calculation in conformance with rules issued by the USEPA.

According to the LCR, compliance samples must be a first draw, 1-liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted high-risk sampling sites, called Tier 1 sampling sites. For a municipality such as the City, the Tier 1 sampling pool must consist of single family structures that are:

- served by a lead service line,
- contain lead pipes, or
- contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

As long as a community has Tier 1 sites that contain lead services, they are required to collect at least 50 percent of their compliance samples from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters, etc.

One of the samples submitted by the City was excluded from the 90th percentile compliance calculation in the latest monitoring period because it was taken from a tap at a non-residential site. The other sample result that was removed was collected from a single family home that has a whole house treatment system. Both of these sites are, therefore, excluded from the compliance consideration based upon federal rules. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point-of-use or point-of-entry treatment can only be used if the community has insufficient Tier 1 sites available.

5. Did the DEQ review the information submitted by the City to ensure all samples were from Tier 1 sites?

Yes. The DEQ examined the information submitted and certified by the City that their LCR sampling pool consisted entirely of lead service lines from single-family homes, which met the requirements of this rule to maximize sampling of high-risk targeted sites.

During the initial implementation of the LCR approximately 25 years ago, water supplies were required to complete a materials evaluation of their distribution system to identify a pool of targeted, high-risk sampling sites. These sites were to be categorized into one of

three tiers (1, 2, or 3) based on risk. The DEQ created an LCR reporting template for water systems to identify each compliance sampling site by Tier, and if they are in the highest Tier (1), to indicate why these sites qualify by having a lead service line, or because they either have copper piping installed with high lead content solder or they have lead plumbing in the home.

If a water system has sufficient Tier 1 sites, they are required to sample them before using any lower tier sites. Furthermore, if they have sufficient sampling sites with lead service lines, they are required to use them to make up at least 50 percent of their sampling pool each monitoring period. Water supplies are also required to use the same sampling sites each time or explain on their LCR reporting form why they were unable to do so. Finally, we require the water system to certify all of the information they provide on the LCR reporting form is factual.

The DEQ must rely upon the public water system to identify appropriate sampling sites for LCR monitoring. The DEQ public water supply program has no control or authority over service lines or domestic plumbing. As a result, we have no records on construction standards or materials used by customers for these components. If these records exist, they are kept locally where they are reviewed and approved by local agencies such as building departments or plumbing inspectors.

In 2015, City employees again certified that the information submitted on their LCR monitoring reports for the two 6-month rounds of monitoring conducted after they began treating the Flint River were accurate, and DEQ staff review of that information indicated it was in compliance with the monitoring requirements. It was not until October 2015 when the DEQ heard City employees revealing to the media that they did not know for certain if their compliance monitoring was collected from homes with lead service lines. As a result, the DEQ began to investigate their monitoring sites. As the City began to transfer their customer information to electronic records, the DEQ determined from the information available that a significant number of these sites that had been listed as having lead service lines either did not have them or the information was unavailable. On November 9, 2015, the DEQ notified the City in writing that it would be necessary to conduct a complete assessment of their sampling pool and report back their findings within a month. The DEQ is now awaiting the City's report.

Comment [LJSS1]: Need to check this date

6. **Did the DEQ believe the levels of lead found at 212 Browning in April 2015 were indicative of a system-wide problem?**

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The City replaced the lead service line May 6, 2015. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem, and subsequent sampling taken at this address showed that replacement of the service line did mitigate the problem. There was, therefore, no reason to believe that this was indicative of a system-wide problem.

7. Do the DEQ's sampling instructions comply with the LCR?

We continue to disagree with the USEPA on sampling protocols. We have attempted to ensure compliance with the USEPA's guidance provided in the preamble to their lead and copper regulations that said that household use should be "typical" for a residential customer on the day before sample collection for lead and copper. Early in the implementation of the LCR, we had encountered too many situations where compliance samples had been collected from kitchen and bathroom taps that had not been used in days and in some cases, even weeks, resulting in excessively stagnated water and correspondingly high lead levels that did not represent typical exposure expected after overnight stagnation. To incorporate these results into further regulatory decision making could have led to actions that were not indicative of a true public health threat. Further complicating this issue was the USEPA's direct implementation of the LCR in Washington, D.C., where it was learned that some "valid" lead results were not always being included in compliance calculations. Subsequently, the USEPA made invalidation of samples for any reason much more difficult. In order to ensure samples were taken at customer taps representative of typical use, we devised our current recommendations for ensuring appropriate but not excessive stagnation for LCR monitoring.

We continue to believe it is appropriate to flush these taps the day before sample collection to simulate and/or ensure typical household use before the tap is allowed to sit overnight to achieve the expected stagnation time (the regulation recommends a minimum 6 hours stagnation prior to collecting the first draw sample). The LCR does not say the result should represent the "absolute worst case" condition – it talks about sampling the highest risk locations (lead plumbing, lead service lines, high lead content solder piping, etc.) after overnight stagnation and then collecting a first draw sample so as not to flush elevated lead from that tap at that point in time. Until the USEPA changes this rule, we are satisfied with our sampling protocol.

8. Does the DEQ require the use of small-neck bottles to obtain samples?

No. The DEQ does not mandate the use of small-neck bottles; it is the sampling method that is specified in both the federal SDWA and Act 399. Each certified drinking water laboratory provides bottles to their customers upon request for any particular analysis. The bottles provided by the DEQ Drinking Water Laboratory for a lead and copper corrosion control sample do happen to have a small cap opening.

9. Why did the DEQ admit mistakes and apologize?

The mounting Freedom of Information Act Requests brought to the director's attention, information from within the DEQ that was not previously known to Director Dan Wyant– specifically, that the USEPA field staff had raised the question of corrosion control in the spring of 2015 and had been critical of the DEQ's protocol and testing process. It seemed clear that the USEPA field staff had opined that DEQ staff had employed the incorrect protocol. In the face of that new information, Direct Wyant felt compelled to acknowledge that an error may have been made as part of moving the conversation and the situation forward.

The subsequent acknowledgement by the USEPA's regional and headquarters leadership that the LCR speaks ambiguously on the issue of continued corrosion control, and that the DEQ did not employ a protocol that was 'wrong,' was of considerable consolation to the DEQ staff but only left agency leadership feeling more resolute that the LCR needs to be changed, and the DEQ is interested in being part of that process.

Also, there should not have been any disrespect or discredit for those who raised the lead in water issue in Flint. For a tone that did not recognize the seriousness or the issue, Director Wyant did apologize.



City of Flint Drinking Water
Outline prepared by the
Michigan Department of Environmental Quality for the
Flint Water Task Force

I. INTRODUCTION

This document is intended to provide an overview of Michigan's implementation of the Safe Drinking Water Act, 1976 PA 399, as amended (Act 399), with respect to events in the city of Flint (City), Michigan.

II. BACKGROUND

1. How has Flint historically obtained its drinking water?

The water system in the City was organized and built under private ownership in 1883 as the Flint Water Works Company to pump raw water from the Flint River to their consumers. In 1903, the system was converted to a municipally-owned corporation which supplied drinking water to the City. In 1967, the City switched and became a customer of the Detroit Water and Sewerage Department (DWSD) system.

After the switch to DWSD, the City operated their water treatment plant as a standby plant for purposes of reliability in the event of an emergency such as an interruption in service via the single pipeline from DWSD.

During 2009, the water treatment plant was used in an emergency capacity in two instances: June 18 through June 20 and September 10 through September 13. Additionally, as a backup emergency plant, the City was required to operate the plant quarterly to demonstrate the capability to produce safe water in accordance with Act 399 and to keep mechanical equipment (such as valves, rubber seals, etc.) in good working order. Each quarter, the plant was test run and samples were taken of both raw water and of finished water (post-filters). Monitoring showed that the WTP was performing as designed. However, as a result of contractual obligations with DWSD, this treated water was not put into the City's distribution system during these test runs, but rather was discharged to the river in accordance with a National Pollutant Discharge Elimination System (NPDES) Permit. The test runs were for demonstration purposes, to keep the plant operational, and staff familiar with operation in the event it was needed in an emergency.

2. What State and Federal laws or rules exist to ensure safe drinking water is provided to City residents?

The federal Safe Drinking Water Act (federal SDWA) is the primary law that ensures the quality of Americans' drinking water. Under the federal SDWA, the United States Environmental Protection Agency (USEPA) sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.

The federal SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and

1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. (The federal SDWA does not regulate private wells which serve fewer than 25 individuals.)

Originally, the federal SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

The most direct oversight of water systems is conducted by state drinking water programs. States can apply to the USEPA for "primacy," the authority to implement the federal SDWA within their jurisdictions, if they will adopt standards at least as stringent as the USEPA's and enforce those standards. Michigan adopted the Safe Drinking Water Act in 1976 through Act 399 and has maintained primacy for the program since that time.

3. **What is the USEPA's role as a regulatory agency in implementing the SDWA?**

Federal and state governments share responsibility for administering drinking water programs. Under the federal SDWA, the USEPA is given the responsibility for developing national standards and regulations that apply to the nation's public drinking water systems and enforcing those standards, by working with states.

Michigan's drinking water program is audited annually by the USEPA for compliance with the federal SDWA. Based upon these audits, the USEPA continues to find Michigan's drinking water program to be compliant with the federal SDWA.

4. **What is the Michigan Department of Environmental Quality's (DEQ) role as a regulatory agency in implementing the SDWA?**

The federal SDWA permits states to accept oversight of the drinking water program under an agreement with the USEPA giving states primary enforcement responsibilities (or primacy). In addition to this delegation of federal authority to the states, states also have the power to create additional regulations and programs governing drinking water suppliers through their own legislative and regulatory processes. Michigan has had regulatory authority providing oversight of public water supplies since 1913 (Waterworks and Sewerage Systems, Act 98 of 1913).

The DEQ has been granted primary enforcement authority in Michigan for the federal SDWA under the statutory authority of Act 399. As such, the DEQ, Office of Drinking Water and Municipal Assistance (ODWMA) has regulatory oversight for all public water supplies, including approximately 1,425 community water supplies and 10,000 noncommunity water supplies. A community water supply provides year-round service to 15 or more living units or 25 or more residents. A noncommunity water supply has 15 or more service connections or serves 25 or more individuals on an average daily basis for not less than 60 days per year.

The DEQ engages in a variety of activities to help water systems remain in, or return to, compliance. These activities include: conducting surveillance visits at water systems and reviewing their facilities, equipment, and operations; requiring the submission of plans and specifications for waterworks system improvements and issuing construction permits; providing for the training, examination, certification and regulation of persons operating water supplies; helping systems invest in preventive measures; and since 1996, providing financial assistance for system improvements.

5. **What is the City's role in implementing the federal SDWA?**

State and federal programs develop regulations and perform oversight and compliance activities, but do not treat or deliver water to customers. At the local level, public and private water utilities collect, treat, and deliver drinking water to consumers in compliance with state and federal regulations.

To ensure that drinking water is safe, the federal SDWA sets up multiple barriers against pollution. These barriers include: source water protection, multiple treatment components, distribution system integrity, proper operations oversight, and public information. As a public water system, the City is responsible for ensuring proper design, construction, operations and maintenance, so that contaminants in tap water do not exceed the standards established by law. The City treats the water, and must test their water frequently for specified contaminants and report the results to the DEQ. If a water system is not meeting these standards, it is the water supplier's responsibility to notify its customers.

The federal SDWA recognizes that customers have the right to know what is in their drinking water and where it comes from. The City, like all water suppliers, must notify consumers quickly when there is a serious problem with water quality. Water systems serving the same people year-round must provide annual consumer confidence reports (CCR) on the source and quality of their tap water.

The City submits samples of their water for laboratory testing (monitoring) to verify the water they provide to residents meets all federal and state standards. How often and where samples are taken varies from system to system and from contaminant to contaminant. The DEQ provides an annual monitoring schedule to the City setting forth these requirements.

In addition, the City is required to employ properly, certified water operators that are trained and experienced to operate the treatment and distribution system associated with the City's water system.

III. THE FLINT RIVER – IS IT A SAFE SOURCE OF DRINKING WATER?

In Michigan, we are fortunate to have high quality drinking water sources. Seventy percent of Michigan's population receives its drinking water from surface water sources, the majority of which is withdrawn from the Great Lakes. A handful of public water supplies in Michigan do treat water from inland rivers, lakes or groundwater under the influence of

surface water. All surface water sources and groundwater under the influence of surface water requires significant treatment in order to be safe for consumption. Treatment of surface water is referred to under Act 399 as "complete treatment."

While all surface water sources must receive this higher level of treatment, river sources present a greater challenge than water withdrawn from one of the Great Lakes. River sources are more challenging to treat because of how rapidly water quality may change compared to Great Lakes sources. Under most circumstances, rivers are also prone to greater fluctuations in temperature, have higher amounts of organic material, greater turbidity (suspended solids), and are more vulnerable to microbiological and viral contamination than Lakes Huron, Erie, Michigan or Superior. It should be noted, that while the water chemistry in the Flint River differs from that in Lake Huron, it can still be treated in accordance with the federal SDWA and Act 399. Many cities across the country rely on similar sources for drinking water. The waterworks industry has the technology to treat wide ranging source waters to provide potable and palatable drinking water, including direct reuse of wastewater. Regardless of source water quality, all public water systems must comply with the same drinking water standards in the finished water.

Also, it is not the source water that reacts with the homeowners plumbing out in the distribution system, but rather the finished water quality that is important. ~~To begin with,~~ Neither the Flint River nor the treated water leaving the City's WTP contains lead. In addition, the treatment process employed by the City includes lime softening to reduce the hardness in the river water. Lime softening is not a process that would typically be thought to increase corrosivity of water. The City, however, does practice recarbonation to readjust pH at the end of the softening process. pH levels of finished water leaving the City's WTP averaged 7.7. Water monitoring conducted quarterly at 25 sample sites located throughout the distribution system showed the following:

July – September 2014	average pH = 7.71	range: 7.56 – 7.86
October – December 2014	average pH = 7.88	range: 7.62 – 8.10
January – March 2015	average pH = 7.81	range: 7.60 – 7.99
April – June 2015	average pH = 7.63	range: 7.48 – 7.80

The following data was obtained at the same sampling locations throughout the City's distribution system, but while they were still purchasing water from DWSD before the City switched to the River as a source:

January – March 2014 (DWSD)	average pH = 7.47	range: 7.40 – 7.54
April 2014 (DWSD)	average pH = 7.49	range: 7.42 – 7.59

Note that the pH ~~numbers~~ while the City was treating the Flint River did not differ significantly from those produced by DWSD, and in fact, water produced while using the Flint River ~~tended to be slightly higher (less corrosive).~~

IV. *E. COLI* AND TOTAL COLIFORM BACTERIA VIOLATIONS

1. **What caused the *E.Coli* and total coliform bacteria violations experienced by the City in August and September 2014?**

A number of factors, not one specific cause, likely contributed to the Boil Water Advisories (BWAs) in the City during August and September 2014 triggered by exceedances of bacteria standards in limited areas of the distribution system. ~~While the Flint River has higher levels of natural organic matter than typically found in the Great Lakes, Flint's water treatment plant (WTP) performed well above requirements for removal of organic carbon.~~ ~~In addition,~~ the coliform detections were confined to less than 20 percent of the water system. If treatment had been compromised, detections would have been expected throughout the City rather than in such a limited geographic area.

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Instead, the violations seem to have been caused by other factors such as aging infrastructure and unusual weather patterns. The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of unlined cast iron piping. This cast iron pipe is subject to internal corrosion, called tuberculation, which thins and weakens the pipe walls in some areas and causes a buildup of sediment and debris on the pipe walls in other areas. Tuberculation can lead to water quality issues as well as reduced flows and pressures. Tuberculation also encourages the development of biofilms, or layers of bacteria that attach to the rough surfaces of interior pipe walls. Biofilm growth is common in areas where little or no disinfectant residual is maintained.

water age

The City has also experienced decades of a declining customer base and water use, with vacant homes, commercial businesses and industrial property. Declining water use leads to excess residence time (stagnation) within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and loss of disinfectant residual. While the City has recently seen an infusion of funding for blight removal, contractors completing this work have been known to improperly use fire hydrants, causing hydraulic disturbances that dislodged and suspended settled debris, which may have contributed to the bacterial contamination. These hydraulic disturbances were also believed to be the source of the aesthetic water quality complaints both the city and DEQ were receiving.

The winter of 2013/2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30 percent, saw even greater losses since February of that year due to an increase in cold weather related water main breaks and leaks (City personnel reported 400 water main breaks in calendar year 2014, with greater than 50 percent in the winter quarter). The City has also been lacking a formal maintenance program for its more than 7,250 valves, which are critical in limiting the areas impacted during water main repairs. As an example, two valves on the transmission line used to supply the area of the 2014 BWAs were found to be closed during the City's investigation of possible sources, causing much longer residence times, reduced disinfectant residuals, and reduced pressures – all potential avenues for contamination to enter a distribution system.

The BWAs also occurred during the warmest and relatively wet periods of August and September 2014. Warm weather conditions are not only more conducive to bacterial

growth but also degrade disinfectant residuals more quickly. As already explained, longer residence times, biofilms, and tuberculation contribute to disinfectant residual degradation. Warm, wet weather conditions also allow water contaminated with bacteria to accumulate or pond around piping that leaks and breaks.

During the summer of 2014, the city was actively repairing the distribution system (City personnel reported 29 water main breaks in June through August 2014). After the switch to the Flint River, it was discovered that there were many broken or closed valves in the distribution system (City personnel reported 120 broken valves and 239 valves in an improper position). As the city began correcting this problem they did detect the presence of coliform organisms in the distribution system in the testing conducted as a result of the repairs. This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

2. How were the violations detected? What was the DEQ's response?

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Federal SDWA Regulations regarding monitoring and standards for bacteria in water distribution systems are incorporated into Act 399. There are a variety of bacteria, parasites, and viruses which can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, water systems are required to test for total coliform and *E.coli*. Total coliform bacteria, while not pathogenic, often originate from the same sources as many pathogens. Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system indicates a minimal likelihood that pathogens are present. *E.Coli* is itself a pathogen and its detection is considered direct evidence of a health risk.

The BWAs which occurred in the City were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the City collaboratively in consultation with the DEQ.

Once a BWA has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Using ~~the most common~~ analytical methods, samples must be incubated for 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a BWA. Adding each of these steps together, a normal response period to rescind a BWA under these circumstances would be expected to take 3 to 4 days.

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Upon receiving information indicating total coliform and *E. Coli* bacteria had been detected, DEQ advised the City to issue a BWA from August 15 through 20, 2014, for the affected portion of the City. Another BWA was issued from September 5 through 9, 2014, due to localized detections of total coliform bacteria in the same and adjacent portions of the City.

The advisory covered an area approximately 6 square miles or less than 20 percent of the water department's service area of just over 34 square miles.

No total coliform or *E. Coli* bacteria detections have been reported in the City since September 2014.

V. TOTAL TRIHALOMETHANES (TTHM) VIOLATIONS

1. What caused the TTHM violations experienced by the City beginning in late summer 2014?

Disinfectants are an essential element of drinking water treatment because of the barrier they provide against waterborne disease-causing microorganisms. However, disinfection byproducts (DBPs) form when disinfectants used to treat drinking water react with naturally occurring materials in the water (e.g., decomposing plant material). A major challenge for water suppliers is how to control and limit the risks from pathogens and disinfection byproducts. It is important to provide protection from pathogens while simultaneously minimizing health risks to the population from disinfection byproducts.Total Trihalomethanes (TTHM – chloroform, bromoform, bromodichloromethane, and dibromochloromethane) and halogenated acetic acids (HAA5 – monochloro-, dichloro-, trichloro-, monobromo-, dibromo-) are widely occurring classes of DBPs. The amount of TTHM and HAA5 in drinking water from one water system can change from day to day, depending on the season, water temperature, amount of chlorine added, the amount of plant material in the water, and a variety of other factors. All community water systems that chemically disinfect or purchase water that has been chemically disinfected are required to monitor for DBPs

The Flint River has higher levels of organic material than water in the Great Lakes and as a result the water produced by the City developed higher DBPs than the water provided by DWSD. However, because the WTP was previously operating intermittently as an emergency backup supply with water being wasted rather than entering the distribution system, it was not possible to predict DBP formation until the City began relying on it continuously.

As mentioned previously, the City became aware that there were numerous broken valves and closed valves that should have been open in the distribution system. At this time, the City also began a mapping effort to identify "water age" in the distribution system. The longer the residence time or "water age" the greater the opportunity for the formation of DBPs.

2. How were the violations detected? What was the DEQ's response?

In preparing to rely on the Flint River, the City installed an ozone treatment system to help reduce the organic material (known as precursors), but additional measures were necessary. Because TTHM and HAA5 maximum contaminant levels (MCLs) are calculated based on a running annual average at specific distribution system locations, the actual violation of the federal SDWA standard did not occur until the fall of 2014. However, it was apparent in the

summer of 2014 that the standard would eventually be exceeded; the DEQ asked the City to proactively implement measures to address the problem before the violation required them to do so.

As a result of maintenance efforts undertaken by the City to repair valves and correct improperly closed valves; the City was able to improve hydraulic characteristics of the distribution system and thereby reduce residence time or "water age" in the system. Operational changes made to reduce the amount of storage in the system also helped reduce residence time which contributed to a reduction in DBP formation.

In addition to operational changes to minimize residence time in the distribution system, the City added granular activated carbon to their filters after receiving a construction permit from the DEQ on July 14, 2015. Levels of TTHMs and HAA5s were reduced and the City returned to compliance with the running annual average (MCL) on September 1, 2015.

(construction permit required for any entity to place a treatment process)

VI. THE TASTE, ODOR, AND COLOR COMPLAINTS RECEIVED BY FLINT

1. What caused the taste, odor and color complaints received by the City from residents?

Taste, odor and color issues are very personalized. In the City, during the summer after the switch to the Flint River as a water source, taste, odor, and color complaints increased. At the time, increases in color, odor and changes in taste appear to occur because of changes in hydraulic conditions within the distribution system. Water leaving the WTP did not have any unusual odor or color. However, construction in the distribution system, hydrant flushing, and changes in flow characteristics are all known causes of disturbances with the distribution system that can cause an increase in taste, odor and color. Aesthetics, such as taste, odor, and color, while a concern, by themselves are not a threat to public health.

2. What was the DEQ's response?

The DEQ consulted with the City regarding these complaints. The City indicated that they were offering testing for anyone that had issues and that they were not able to verify the complaints. Jugs of discolored water were being brought to meetings, but City personnel informed the DEQ that they were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHMs, it was anticipated that there would be short term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) often causes temporary problems as described. Based on information from City personnel, it appeared that the complaints were related to such operational activities occurring in the distribution system.

VII. LEAD ISSUES IN THE FLINT DRINKING WATER

1. What causes lead in drinking water?

Lead is rarely found in source water. Lead enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead fixtures, and solder. Older homes built prior to World War II, are more likely to contain lead pipes. The most common problem with newer construction is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially hot water. The amount of lead in tap water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the pH of the water, and its temperature.

2. Are there any safe levels of lead?

The federal SDWA requires the USEPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. These non-enforceable health goals, based solely on possible health risks are called maximum contaminant level goals (MCLGs). The MCLG for lead is zero. The USEPA has set this level based on the best available science which shows there is no safe level of exposure to lead.

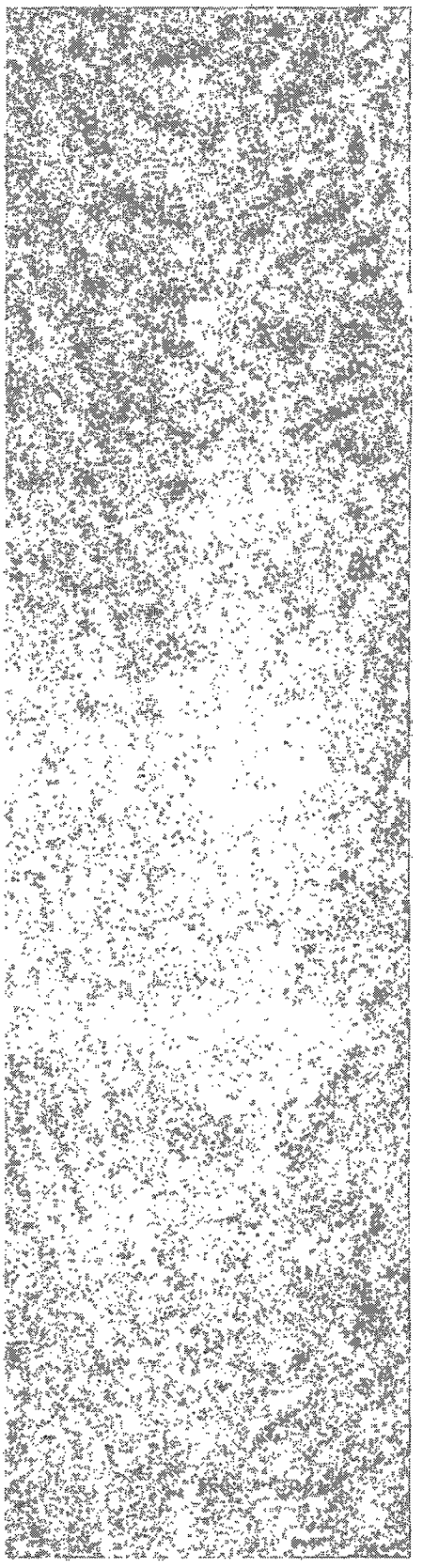
3. What is the Lead and Copper Rule?

Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. On June 7, 1991, the USEPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR).

The treatment technique for the rule requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 15 ppb or copper concentrations exceed an action level of 1.3 parts per million (ppm) in more than 10 percent of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the AL for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control.

4. What is the lead action level (AL)?

For most contaminants, the USEPA sets an enforceable regulation called an maximum contaminant level (MCL) based on the MCL Goal (MCLG). MCLs are set as close to the MCLGs as possible, considering cost, benefits, and the ability of public water systems to detect and remove contaminants at the WTP using suitable treatment technologies. However, because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, the USEPA established a treatment technique rather than an MCL for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to control a contaminant. The treatment technique regulation for lead (referred to as the Lead and Copper Rule) requires water systems that produce drinking water to control the corrosivity of the water. The regulation also requires systems to collect customer tap samples from sites served by the system that are more likely to have plumbing materials



containing lead. If more than 10 percent of a system's tap water samples exceed the lead AL of 15 parts per billion (ppb), then water systems are required to take additional actions including:

•Optimizing their corrosion control treatment (for water systems serving 50,000 people that have not fully optimized their corrosion control).

•Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.

•Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

5. Did DWSD have a corrosion control plan?

After the LCR passed in 1991, DWSD and all of their consecutive customer systems conducted two rounds of monitoring for lead and copper. Copper levels were well below AL limits; but lead levels exceeded the AL of 15 ppb in Detroit and many of their customer communities. As a result, DWSD installed corrosion control treatment. DWSD performed a corrosion control study and concluded that they could reduce the corrosivity of the water by the addition of an orthophosphate.

6. Did the DEQ require the City to have a corrosion control plan in place when it switched to the Flint River as its source of drinking water?

No. There are two ways under the LCR to deem a water supply as providing "optimal corrosion control" -- either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment if it is needed. The DEQ requested that the City perform two 6-month rounds of monitoring to demonstrate if the City was practicing optimal corrosion control treatment. According to state regulations (R325.604f (2) (iii), a system can demonstrate that it is "practicing optimal corrosion control" by sampling in two, consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the Flint River has 0 ppb lead, the City would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods.

In addition, the City had been purchasing water from DWSD that was treated for corrosion control. It was DWSD that was considered as having optimized corrosion control at that point. Since the City had not been the supplier of water before, the DEQ did not require the City to "maintain" corrosion control for which it was not responsible. It could not "maintain" operations undertaken elsewhere by a different entity for a different source of water. The DEQ's instructions to the City were consistent with its past practices ~~and its belief that the City should have been~~ afforded ~~the same opportunity that all other large water systems were initially granted to demonstrate optimal corrosion control treatment through full-scale monitoring under the applicable rules~~. For these reasons, two 6-month

rounds of monitoring, as required by the LCR were the required means to determine whether or not optimal corrosion control was being achieved.

7. How does the DEQ calculate the 90th percentile?

To determine the 90th percentile of a list of lead or copper results, the procedure below is followed:

Step 1: Place lead or copper results in ascending order
Step 2: Assign each sample a number, 1 for lowest value
Step 3: Multiply the total number of samples by 0.9 – this yields the 90th percentile sample. For example: 20 samples x 0.9 = 18th sample. This is the 90th percentile level.

Calculating the 90th percentile is easiest when a supply collects 10 samples (or a multiple of 10). Note that the 90th percentile must be interpolated if the number of samples is not a multiple of 10.

8. What was the result of the first round of monitoring conducted by the City?

The first 6-month round of lead and copper monitoring conducted by the City ended on December 31, 2014. One hundred samples were submitted and the 90th percentile lead level was calculated to be 6 ppb.

A 90th percentile lead result of 6 ppb is not unusual and did not approach the AL or cause alarm. Many water supplies in Michigan and across the country have 90th percentile levels of lead greater than this. Even systems that have installed treatment and are considered optimized by definition can and do have levels between 5 ppb and 15 ppb. For example, in 2014, the following communities had lead results as indicated: DWSD (2.3 ppb), Grand Rapids (2.2 ppb), Kalamazoo (13 ppb), Lansing Board of Water and Light (7.8 ppb), and Saginaw (8 ppb).

6 ppb

90th percentile

9. What was the result of the second round of monitoring conducted by Flint?

The second 6-month round of lead and copper monitoring conducted by the City ended on June 30, 2015. Sixty-nine samples that complied with the site selection criteria submitted and the 90th percentile lead level was calculated to be 11 ppb. The conclusion from these results was that the City, while in compliance with the AL, exceeded the level required to be deemed as having optimized corrosion control.

10. Why was the City required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of Act 399.

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples the City was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census, which listed the City's population as more than 100,000 residents. In March of 2015, the City provided updated information that indicated the City's population had decreased to less than 100,000. Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

11. What actions did the DEQ order the City to undertake after the second round of monitoring?

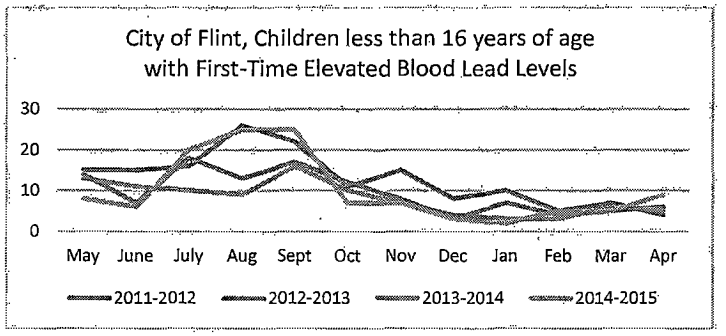
While the City's LCR compliance monitoring continued to meet AL requirements, the City exceeded the level required to be deemed as having optimized corrosion control. Following receipt of the City's compliance monitoring results, the DEQ required the City to install corrosion control treatment in correspondence dated August 17, 2015.

Under the LCR, the City has 6 months to let the DEQ know whether it intends to conduct a study, then 18 months to perform the study and make their recommendation, and 24 months to complete installation of the selected corrosion control. The DEQ requested the City to accelerate this schedule. The City submitted plans and specifications to install corrosion control treatment and a construction permit was issued by the DEQ on October 28, 2015. The City is in the process of installing the necessary equipment and procuring the appropriate chemicals. Treatment is expected to be on-line by the end of November 2015.

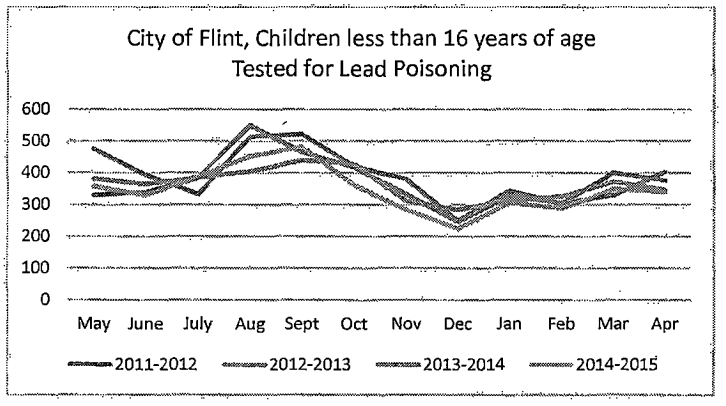
12. What had Department of Health and Human Services (DHHS) advised the DEQ regarding blood lead levels prior to the DEQ ordering the City to implement optimized corrosion control?

In an e-mail dated July 28, 2015, DHHS indicated that they "compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –

* Lead testing rates remained about the same from year-to-year (chart on the right).



- There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).



- However, that pattern was not terribly different from what we saw in the previous three years; especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).

- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspected that the summer data spike may be related to this effect.

- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015."

This e-mail from DHHS in concert with the completion of two 6-month rounds of lead compliance sampling data indicating that the City had not exceeded an AL for lead provided

the basis for the DEQ to maintain that the water in the City continued to be in compliance with the federal SDWA and was safe for consumption.

13. When did the DEQ first become aware of allegations of elevated blood levels being detected in certain children?

The DEQ was notified on August 23, 2015, by a professor from Virginia Tech that "over the next few months we will be studying Flint water quality issues..." and similarly notified by the USEPA on August 28, 2015. Results indicating elevated lead levels in homes were reported as part of this study in late August. In early September 2015, information was reported in news articles that pediatricians in the City had data suggesting an increase in children's blood lead levels in two zip codes in the Flint area.

By this time, the City had already completed the required two 6-month rounds of monitoring and a determination had been made by the DEQ that the City must install corrosion control treatment as documented in correspondence dated August 17, 2015.

VIII. QUESTIONS RAISED REGARDING THE DEQ'S ACTIONS

1. What was the DEQ's response to the USEPA's inquiry in February 2015 regarding the optimized corrosion control treatment being implemented by the City under the LCR?

The DEQ indicated that the City was in compliance with the LCR. 90th percentile levels were below the AL of 15 ppb and not unusual when compared to other large Michigan cities. The City was already conducting the second round of monitoring which would provide for a determination of whether additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the LCR that lead results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile AL in the LCR.

2. Did the DEQ attempt to mislead the USEPA in a February 27, 2015, e-mail responding to the USEPA's inquiry regarding Optimal Corrosion Control Treatment (OCCT)?

No. There is an e-mail from Steve Busch indicating that the City was practicing a corrosion control program. What was meant was that the City was performing the required monitoring to determine whether or not they were "practicing optimal corrosion control". The DEQ subsequently clarified its position in follow-up telephone conversations with the USEPA.

3. Has the USEPA subsequently admitted that the LCR is subject to differing interpretations such as that presented by the DEQ?

Yes. On November 3, 2015, the USEPA issued a Memorandum to all 50 states regarding the "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems". This memorandum addresses concerns raised about the application of the LCR, specifically the requirements pertaining to maintenance of OCCT, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. The USEPA states that this type of situation rarely arises, that

the language of the LCR does not specifically discuss such circumstances, and that there are differing possible interpretations of the LCR with respect to how the rule's OCCT procedures apply to this situation. The memo is intended to clarify prospectively steps agencies should take or apply in the future. By admitting that the LCR is subject to differing interpretations, the DEQ believes its interpretation and application of the LCR has been validated.

4. Did the DEQ reject any of the samples submitted by the City?

Yes, samples at two locations were excluded from the compliance calculation in conformance with rules issued by the USEPA.

According to the LCR, compliance samples must be a first draw, 1-liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted high-risk sampling sites, called Tier 1 sampling sites. For a municipality such as the City, the Tier 1 sampling pool must consist of single family structures that are:

* served by a lead service line,
* contain lead pipes, or
* contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

As long as a community has Tier 1 sites that contain lead services, they are required to collect at least 50 percent of their compliance samples from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters, etc.

One of the samples submitted by the City was excluded from the 90th percentile compliance calculation in the latest monitoring period because it was taken from a tap at a non-residential site. The other sample result that was removed was collected from a single family home that has a whole house treatment system. Both of these sites are, therefore, excluded from the compliance consideration based upon federal rules. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point-of-use or point-of-entry treatment can only be used if the community has insufficient Tier 1 sites available.

5. Did the DEQ review the information submitted by the City to ensure all samples were from Tier 1 sites?

Yes. The DEQ examined the information submitted and certified by the City that their LCR sampling pool consisted entirely of lead service lines from single-family homes, which met the requirements of this rule to maximize sampling of high-risk targeted sites.

During the initial implementation of the LCR approximately 25 years ago, water supplies were required to complete a materials evaluation of their distribution system to identify a pool of targeted, high-risk sampling sites. These sites were to be categorized into one of

three tiers (1, 2, or 3) based on risk. The DEQ created an LCR reporting template for water systems to identify each compliance sampling site by Tier, and if they are in the highest Tier (1), to indicate why these sites qualify by having a lead service line, or because they either have copper piping installed with high lead content solder or they have lead plumbing in the home.

If a water system has sufficient Tier 1 sites, they are required to sample them before using any lower Tier sites. Furthermore, if they have sufficient sampling sites with lead service lines, they are required to use them to make up at least 50 percent of their sampling pool each monitoring period. Water supplies are also required to use the same sampling sites each time or explain on their LCR reporting form why they were unable to do so. Finally, we require the water system to certify all of the information they provide on the LCR reporting form is factual.

The DEQ must rely upon the public water system to identify appropriate sampling sites for LCR monitoring. The DEQ public water supply program has no control or authority over service lines or domestic plumbing. As a result, we have no records on construction standards or materials used by customers for these components. If these records exist, they are kept locally where they are reviewed and approved by local agencies such as building departments or plumbing inspectors.

In 2015, City employees again certified that the information submitted on their LCR monitoring reports for the two 6-month rounds of monitoring conducted after they began treating the Flint River were accurate, and DEQ staff review of that information indicated it was in compliance with the monitoring requirements. It was not until ~~October 2015 when the~~ DEQ heard City employees revealing to the media that they did not know for certain if their compliance monitoring was collected from homes with lead service lines. As a result, the DEQ began to investigate their monitoring sites. As the City began to transfer their customer information to electronic records, the DEQ determined from the information available that a significant number of these sites that had been listed as having lead service lines either did not have them or the information was unavailable. On November 9, 2015, the DEQ notified the City in writing that it would be necessary to conduct a complete assessment of their sampling pool and report back their findings ~~within a month~~ by Dec. 30, 2015. The DEQ is now awaiting the City's report.

Comment [LJS1]: Need to check this date

6. **Did the DEQ believe the levels of lead found at 212 Browning in April 2015 were indicative of a system-wide problem?**

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The City replaced the lead service line May 6, 2015. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem, and subsequent sampling taken at this address showed that replacement of the service line did mitigate the problem. There was, therefore, no reason to believe that this was indicative of a system-wide problem.

7. Do the DEQ's sampling instructions comply with the LCR?

We continue to disagree with the USEPA on sampling protocols. We have attempted to ensure compliance with the USEPA's guidance provided in the preamble to their lead and copper regulations that said that household use should be "typical" for a residential customer on the day before sample collection for lead and copper. Early in the implementation of the LCR, we had encountered too many situations where compliance samples had been collected from kitchen and bathroom taps that had not been used in days and in some cases, even weeks, resulting in excessively stagnated water and correspondingly high lead levels that did not represent typical exposure expected after overnight stagnation. To incorporate these results into further regulatory decision making could have led to actions that were not indicative of a true public health threat. Further complicating this issue was the USEPA's direct implementation of the LCR in Washington, D.C., where it was learned that some "valid" lead results were not always being included in compliance calculations. Subsequently, the USEPA made invalidation of samples for any reason much more difficult. In order to ensure samples were taken at customer taps representative of typical use, we devised our current recommendations for ensuring appropriate but not excessive stagnation for LCR monitoring.

We continue to believe it is appropriate to flush these taps the day before sample collection to simulate and/or ensure typical household use before the tap is allowed to sit overnight to achieve the expected stagnation time (the regulation recommends a minimum 6 hours stagnation prior to collecting the first draw sample). The LCR does not say the result should represent the "absolute worst case" condition – it talks about sampling the highest risk locations (lead plumbing, lead service lines, high lead content solder piping, etc.) after overnight stagnation and then collecting a first draw sample so as not to flush elevated lead from that tap at that point in time. Until the USEPA changes this rule, we are satisfied with our sampling protocol.

8. Does the DEQ require the use of small-neck bottles to obtain samples?

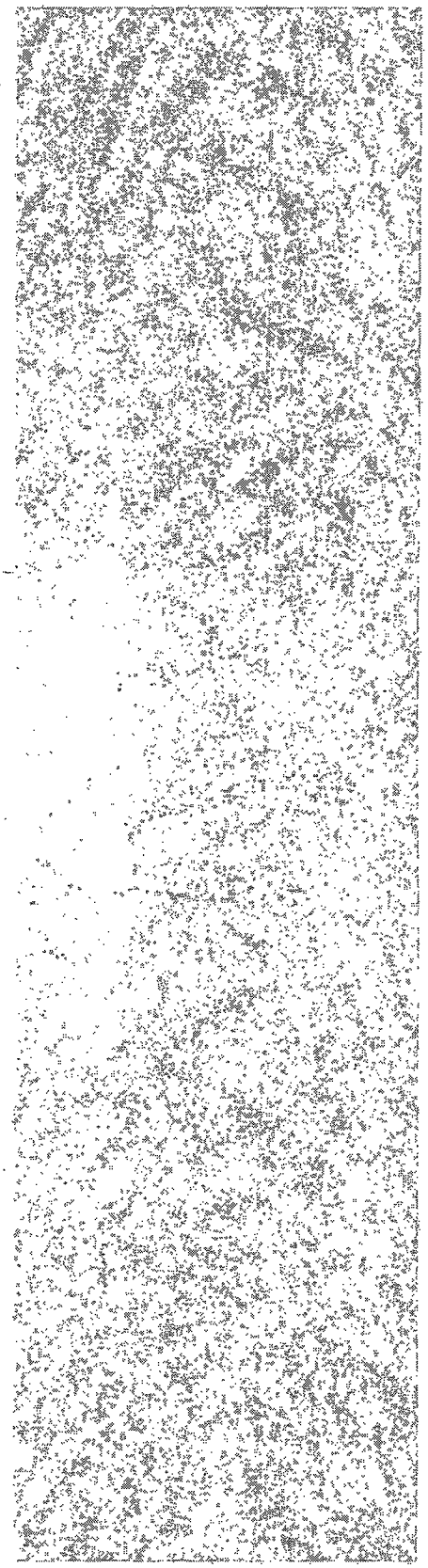
No. The DEQ does not mandate the use of small-neck bottles; it is the sampling method that is specified in both the federal SDWA and Act 399. Each certified drinking water laboratory provides bottles to their customers upon request for any particular analysis. The bottles provided by the DEQ Drinking Water Laboratory for a lead and copper corrosion control sample do happen to have a small cap opening.

9. Why did the DEQ admit mistakes and apologize?

The mounting Freedom of Information Act Requests brought to the director's attention, information from within the DEQ that was not previously known to Director Dan Wyant– specifically, that the USEPA field staff had raised the question of corrosion control in the spring of 2015 and had been critical of the DEQ's protocol and testing process. It seemed clear that the USEPA field staff had opined that DEQ staff had employed the incorrect protocol. In the face of that new information, Direct Wyant felt compelled to acknowledge that an error may have been made as part of moving the conversation and the situation forward.

The subsequent acknowledgement by the USEPA's regional and headquarters leadership that the LCR speaks ambiguously on the issue of continued corrosion control, and that the DEQ did not employ a protocol that was 'wrong,' was of considerable consolation to the DEQ staff but only left agency leadership feeling more resolute that the LCR needs to be changed, and the DEQ is interested in being part of that process.

Also, there should not have been any disrespect or discredit for those who raised the lead in water issue in Flint. For a tone that did not recognize the seriousness or the issue, Director Wyant did apologize.



portions of the City of Flint. The advisory covered an area approximately 6 square miles. The City of Flint has a total land area just over 34 square miles.

No total coliform or E.Coli bacteria detections have been reported in Flint since September 2014.

V. TTHM violations

1. What caused the TTHM violations experienced by Flint beginning in late Summer 2014?

Disinfectants are an essential element of drinking water treatment because of the barrier they provide against waterborne disease-causing microorganisms. However, disinfection byproducts (DBPs) form when disinfectants used to treat drinking water react with naturally occurring materials in the water (e.g., decomposing plant material).

Total trihalomethanes (TTHM – chloroform, bromoform, bromodichloromethane, and dibromochloromethane) and haloacetic acids (HAA5 – monochloro-, dichloro-, trichloro-, monobromo-, dibromo-) are widely occurring classes of DBPs. The amount of trihalomethanes and haloacetic acids in drinking water from one water system can change from day to day, depending on the season, water temperature, amount of chlorine added, the amount of plant material in the water, and a variety of other factors. All community water systems that chemically disinfect or purchase water that has been chemically disinfected are required to monitor for DBPs.

~~TTHMs and HAA5s are the result of organic material in the water reacting with disinfectant used to treat the water.~~ The Flint River has higher levels of organic material than water in the Great Lakes and it was not a surprise that the water produced by the city of Flint developed higher disinfection by-products than the water provided by DWSD. However, because the water treatment plant was previously operating intermittently as an emergency backup supply, it was not possible to predict disinfection byproduct formation until the city began relying on it continuously.

Comment [KR(2]: Need to explain that TTHM and HAA5s are. Are they hazardous to public health? Same for disinfection by-products. This is a pretty technical read – can we add plain English or more explanation?

Comment [KR(3]: During our interviews, we received a number of comments that the major problem was because the organic level did not have time to stabilize before being discharged into the system and their stagnation in the system exacerbated the problem. Just passing on that info.

2. How were the violations detected and what was DEQ's response?

In preparation to rely on the Flint River, the city installed ozone to help reduce the organic material (known as precursors), but additional measures were necessary. Because TTHM and HAA5 MCLs are calculated based on a running annual average at a specific location, the actual violation of ~~city didn't actually violate~~ the safe drinking water act standard for TTHM did not occur until the fall of 2014, but because it was apparent in the summer of 2014 that the standard would eventually be exceeded, DEQ asked the city ~~was asked~~ to proactively implement measures to address the problem before the violation required them to do so. The city added granular activated carbon to their filters (after receiving a construction permit from DEQ on date?) and levels of TTHMs and HAA5s were reduced. The city returned to compliance with the running annual average (MCL) on September 1, 2015.

Shekter Smith, Liane (DEQ)

From: Busch, Stephen (DEQ)
Sent: Thursday, October 16, 2014 3:25 PM
To: Wurfel, Brad (DEQ); Shekter Smith, Liane (DEQ); Benzie, Richard (DEQ); Howes, Sarah (DEQ); Feuerstein, Heather (DEQ); Sygo, Jim (DEQ); Willard, Veronica (DEQ)
Cc: Prysby, Mike (DEQ)
Subject: Media Contact - Flint DW Chloride - Michigan Radio NPR

I was just contacted by Kate Wells, Michigan Radio NPR regarding the recent news about General Motors concerns regarding chloride levels in Flint's Drinking Water.

I explained that chloride does have a secondary level set by EPA which is not for health related issues but rather for taste and aesthetic concerns. Chloride which can generally come from salt, NaCl, sodium chloride, is a normal part of people's diets, and the amounts in Flint's drinking water would likely be minor compared to normal dietary intakes.

She asked about how chloride could be causing corrosion issues at GM. I indicated that I wasn't sure how they were utilizing the water or what their process consisted of. I did indicate that we normally look at other parameters in drinking water such as pH and alkalinity when considering its corrosivity.

She asked about where water is analyzed. I indicated that most chemical analysis is performed at a certified laboratory, and that Flint has generally used the State Drinking Water Lab. She asked about how results are reported and I said that results go back to the system which then provides results to the DEQ, and that the State DW lab will report directly to the DEQ in addition to the City.

She asked about consumer confidence reports (CCRs). I explained that these are federal requirements for all Community Water Systems. I informed her that detections for regulated contaminants would be reported but that with the exception of sodium, unregulated contaminants such as chloride are not required to be reported. That sodium is included so people with low sodium diets can determine their intake from water. I also clarified that the City's current CCR which had to be issued by July 1 would reflect results from 2013 (when Flint was on DWSD) and that 2014 results would be in the CCR issued in 2015.

She asked whether there would be similar health related issues from chloride as there are with sodium since they are both in salt, but I indicated that I'm not aware of any such issue and that if there were EPA would have asked it to be reported on the CCR and/or established a primary standard for it.

She asked about salt entering water, it's visibility, and I explained that when salt is present in water it will dissolve into sodium and chloride, that it would not be visible in the water, especially at the levels indicated.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

Privileged Attorney Client Communication

DRAFT

City of Flint Drinking Water

Outline prepared by the

Michigan Department of Environmental Quality for the

Flint Water Task Force

I. Introduction

This document is intended to provide an overview of Michigan's implementation of the Safe Drinking Water Act with respect to events in the City of Flint.

II. Background

1. How has Flint historically obtained its drinking water?

The water system in Flint, Michigan, was organized and built under private ownership in 1883 as the Flint Water Works Company to pump raw water from the Flint River to their consumers. In 1903, the system was converted to a municipally-owned corporation which supplied drinking water to the City until 1967, when the City switched and become a customer of the Detroit Water and Sewerage Department (DWSD) system. After the switch to DWSD, the city of Flint operated their water treatment plant as a standby, backup emergency plant for purposes of reliability in the event that the single pipeline from DWSD was out of service for any reason.

In 2009, the water treatment plant was operated in this emergency capacity in two instances (dates/number of days). As a backup emergency plant, the city was required to operate the plant quarterly to demonstrate the ability to produce safe water in accordance with Michigan's Safe Drinking Water Act (1976 PA 399) and to keep mechanical equipment in good working order (such as valves, rubber seals, etc.) Each time the plant was test-run quarterly, samples were taken of raw water quality (describe here) and of finished water (post-filters). Treated water was not put into the distribution system during these test runs, but rather was discharged to the river in accordance with a NPDES Permit (confirm with Steve). The test runs were for demonstration purposes only and to keep the plant operational and staff familiar with operation in the event it was needed in an emergency.

2. What State and Federal laws or rules must be complied with in order to ensure safe drinking water is provided to Flint residents?

The federal Safe Drinking Water Act (SDWA) is the primary law that ensures the quality of Americans' drinking water. Under the SDWA, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.

The federal SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. (SDWA does not regulate private wells which serve fewer than 25 individuals.)

The federal SDWA authorizes the United States Environmental Protection Agency (US EPA) to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. US EPA, states, and water systems then work together to make sure that these standards are met.

Originally, the SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

The most direct oversight of water systems is conducted by state drinking water programs. States can apply to US EPA for "primacy," the authority to implement SDWA within their jurisdictions, if they ~~can show that they will~~ adopt standards at least as stringent as US EPA's and ~~make sure water systems meet these~~ standards. Michigan adopted the Safe Drinking Water Act in 1976 and maintained primacy for the program since 1978.

3. **What is EPA's role as a regulatory agency in implementing the SDWA?**

Federal and state governments share responsibility for administering drinking water programs. Under the Safe Drinking Water Act (SDWA), the U.S. Environmental Protection Agency (US EPA) is given the responsibility for developing national standards and regulations that apply to the nation's public drinking water systems and enforcing those standards. Michigan's drinking water program is reviewed annually by U.S. EPA.

4. **What is DEQ role's as a regulatory agency in implementing the SDWA?**

SDWA ~~also~~ allows states to accept oversight of the drinking water program under an agreement with US EPA giving states primary enforcement (or primacy) responsibilities. In addition to this delegation of federal authority to the states, states also have the power to create additional regulations and programs governing drinking water suppliers through their own legislative and regulatory processes.

The DEQ has primary enforcement authority in Michigan for the Safe Drinking Water Act under the legislative authority of the Michigan Safe Drinking Water Act (Act 399). As such, the division has regulatory oversight for all public water supplies, including approximately 1,425 community water supplies and 10,000 noncommunity water supplies.

The ~~State of~~ Michigan DEQ engages in a variety of activities to help water systems remain in, or return to, compliance. These activities include: ~~visiting~~ water systems and reviewing their facilities, equipment, and operations; requiring the submission of plans and specifications for waterworks system improvements and issuing construction permits; providing for the examination, certification and regulation of persons operating water supplies; helping systems invest in preventive measures; providing financial assistance for system improvements; and conducting training sessions.

5. **What is Flint's role in implementing the SDWA?**

These federal and state programs are separate from the activities performed by water systems. State and federal programs develop regulations and perform oversight and compliance activities, but do not actually treat or deliver water to customers. At the local level, public and private water utilities collect, treat, and deliver drinking water to consumers.

To ensure that drinking water is safe, SDWA sets up multiple barriers against pollution. These barriers include: source water protection, treatment, distribution system integrity, and public information. As a public water system, the city of Flint is responsible for ensuring that contaminants in tap water do not exceed the standards. The City treats the water, and must test their water frequently for specified contaminants and report the results to the State. If a water system is not meeting these standards, it is the water supplier's responsibility to notify its customers.

The SDWA recognizes that since everyone drinks water, everyone has the right to know what's in it and where it comes from. The City of Flint, like all water suppliers, must notify consumers quickly when there is a serious problem with water quality. Water systems serving the same people year-round must provide annual consumer confidence reports on the source and quality of their tap water.

The city of Flint submits samples of their water for laboratory testing (monitoring) to verify that the water they provide to its residents meets all federal and state standards. How often and where samples are taken varies from system to system and contaminant to contaminant. The State provides an annual monitoring schedule to the City setting forth these requirements.

In addition, the city of Flint is required to maintain on staff, certified water operators that are trained and experienced to operate the treatment and distribution system associated with the city's water system.

III. **The Flint River – it is a safe source of drinking water?**

In Michigan, we are blessed with high quality drinking water sources. Seventy percent of Michigan's population receives its drinking water from surface water sources, most with intakes in the Great Lakes. A handful of public water supplies in Michigan do treat water from inland sources such as rivers or groundwater under the influence of surface water. While river sources present a greater challenge for

[Our impression is that the average citizen is under the impression that the river water is corrosive and contains lead – we can address no lead, chloride, and lime issues. Address treatment issues to show that water leaving the plant meet all SDWA

requirements. Ph was same as DWSD. Also sets up point that problems arose after water left plant and was disseminated throughout system]

Put from Intro memo IV.

E. Coli and Total Coliform bacteria violations

1. What caused the E.Coli and Total Coliform bacteria violations experienced by Flint in August-September 2014?

A number of factors, not one specific cause, likely contributed to the Boil Water Advisories (BWA's) in the City of Flint during August and September 2014. While use of the Flint River increased the amount of natural organic matter in the City's water, the City's water treatment plant (WTP) performed well above treatment requirements for organic carbon removal. In addition, less than 20% of the water system was included in the advisory area. If treatment had been compromised, detections would have been widespread throughout the City, rather than in such a localized area.

The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of cast iron piping. Cast iron pipe is subject to internal corrosion, called tuberculation, which causes buildup on the pipe interior leading to water quality issues, reduced flow and pressures, and leakage. Tuberculation also encourages the development of biofilms, layers of bacteria that attach to the interior pipe wall. Biofilm growth is common in areas of piping with little or no disinfectant residual, and together with tuberculation can clog water lines to the point of insufficient water pressure.

The City has also experienced decades of a declining user base and water use associated with vacant homes, commercial businesses and industrial property. Declining water use leads to excess residence time within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and disinfectant residual degradation. While the City has recently seen an infusion of funding for blight removal, contractors completing this work have been improperly using fire hydrants, causing hydraulic disturbances that dislodged and suspended settled debris, which may have contributed to the bacterial contamination.

The winter of 2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30%, saw even greater losses since February due to an increase in cold weather related water main breaks and leaks. The City lacks a formal maintenance program for its over 7,250 valves, which would normally be used to limit impacts during break repairs. Two valves on the transmission line used to supply the area of the BWA were found to be closed during the City's investigation, causing longer residence time, reduced disinfectant residual, reduced flow, and reduced pressure.

The BWA's also occurred during the warmest and for 2014 relatively wet periods of August and September. Warm weather conditions are not only more conducive to bacterial growth but also degrade the water's disinfectant residual carried out from the WTP more quickly. Longer residence times, biofilms, and tuberculation also contribute to disinfectant residual degradation. Warm wet weather conditions also allow water contaminated with bacteria to pool around piping with leaks and breaks.

During the summer, the city was actively repairing the distribution system. After the switch to the Flint River, it was discovered that there were many broken or closed valves in the city's distribution system. As the city began correcting this problem they did experience issues of bacteria in the distribution system as a result of the repairs. This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

2. How were the violations detected and what was DEQ's response?

The Boil Water Advisories (BWAs) which occurred in the City of Flint were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the City of Flint collaboratively in consultation with the DEQ.

Regulations regarding monitoring and standards for bacteria in water distribution systems were developed by the EPA, have been in effect since 1990, and incorporated into the Michigan Safe Drinking Water Act. There are a variety of bacteria, parasites, and viruses which can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, water systems test for Total coliform and E.coli. Total coliform bacteria react to water treatment in a manner similar to many pathogens. Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system minimizes the likelihood that pathogens are present. E.Coli is itself a pathogen, and its detection would be direct evidence of a health risk.

Once a BWA has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Using the most common analytical method, samples must be incubated for a period of 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a BWA. Adding each of these steps together, a normal response period to cancel a BWA under these circumstances would be expected to take at least 3 to 4 days.

A BWA was issued from August 15–20, 2014, for a portion of the City of Flint due to localized detections of total coliform and E.Coli bacteria. Another BWA was issued from September 5-9, 2014, due to localized detections of total coliform bacteria in the same and adjacent portions of the City of Flint. The advisory covered an area approximately 6 square miles. The City of Flint has a total land area just over 34 square miles.

Put This Later Doc

V. TTHM violations

1. What caused the TTHM violations experienced by Flint beginning in late Summer 2014?

TTHMs and HAASs are the result of organic material in the water reacting with disinfectant used to treat the water. The Flint River has higher levels of organic material than water in the Great Lakes and it was not a surprise that the water produced by the city of Flint developed higher disinfection by-products than the water provided by DWSD. However, because the water treatment plant was previously operating intermittently as an emergency backup supply, it was not possible to predict disinfection byproduct formation until the city began relying on it continuously.

2. How were the violations detected and what was DEQ's response?

In preparation to rely on the Flint River, the city installed ozone to help reduce the organic material (known as precursors), but additional measures were necessary. Because TTHM and HAA5 MCLs are calculated based on a running annual average at a specific location, the city didn't ~~actually~~ violate the safe drinking water act standard until the fall, ~~but because~~ it was apparent in the summer of 2014 ~~that the standard would eventually be exceeded~~, the city was asked to proactively implement measures to address the ~~problem~~ before the violation required them to do so. The city added granular activated carbon to their filters (after receiving a construction permit from DEQ on date?) and levels of TTHMs and HAASs were reduced. The city returned to compliance with the running annual average (MCL) on September 1, 2015.

IV. The taste, odor, and smell complaints received by Flint

1. What caused the taste and odor complaints received by Flint from residents?

Taste and odor issues are very personalized. Some water systems receive complaints because of too much disinfectant. In Flint, during the summer after the switch to the Flint River as a water source, taste and odor complaints increased. ~~It was believed~~ at the time ~~to be the result of~~ changes in hydraulic conditions within the distribution system. Water leaving the water treatment plant did not have any unusual odor or color. However, construction in the distribution system, hydrant flushing and changes in flow characteristics are all know causes of disturbances with the distribution system that can cause an increase in taste and odor ~~complaints.~~

2. What was DEQ's response?

DEQ consulted with the city regarding these complaints. The city indicated that they were offering testing for anyone that had issues and that they were not able to verify the complaints. Jugs of discolored water were being brought to meetings, but city personnel were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHM's, it was anticipated that there would be short term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) can and will cause temporary problems as described. Based on information from the city personnel, it appeared that the complaints were related to operational activities occurring in the distribution system.

V. The lead issues in the Flint drinking water

1. What causes lead in drinking water?

Lead is rarely found in source water, but enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead pipes, fixtures and solder. The most common problem is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially hot water. Lead can leach into water from pipes, solder, fixtures and faucets (brass), and fittings. The amount of lead in tap water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the pH of the water, and its temperature.

2. What are the lead action levels?

For most contaminants, EPA sets an enforceable regulation called a maximum contaminant level (MCL) based on the MCLG. MCLs are set as close to the MCLGs as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies. However, because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, EPA established a treatment technique rather than an MCL for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to ensure control of a contaminant. The treatment technique regulation for lead (referred to as the Lead and Copper rule) requires water systems to control the corrosivity of the water. The regulation also requires systems to collect tap samples from sites served by the system that are more likely to have plumbing materials containing lead. If more than 10% of tap water samples exceed the lead action level of 15 parts per billion, then water systems are required to take additional actions including:

- Taking further steps optimize their corrosion control treatment (for water systems serving 50,000 people that have not fully optimized their corrosion control) .
- Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.
- Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

3. Are there any safe levels of lead?

The SDWA requires EPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. These non-enforceable health goals, based solely on possible health risks are called maximum contaminant level goals (MCLG). The MCLG for lead is zero. EPA has set this level based on the best available science which shows there is no safe level of exposure to lead.

4. What is the LCR?

Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. On June 7, 1991, EPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR).

The treatment technique for the rule requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 15 ppb or copper concentrations exceed an action level of 1.3 ppm in more than 10% of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the action level for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control.

5. Did DWSD have a corrosion control plan?

After the LCR was passed, DWSD conducted two rounds of monitoring at for lead and copper. Copper levels were well below action level limits; but lead levels exceeded the action level of 15 parts per billion in many of their customer communities. As a result, DWSD needed to install corrosion control treatment. DWSD performed a corrosion control study and concluded that they could reduce the corrosivity of the water by the addition of an ortho-phosphate.

6. Did DEQ require Flint to have a corrosion control plan in place when it switched to the Flint River as its source of drinking water?

No. The DEQ believed there were two ways under the lead/copper rule to deem a water supply as providing "optimal corrosion control" – either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment. DEQ staff thought it was appropriate to call for the city of Flint to perform two 6-month rounds of monitoring to demonstrate if the city was practicing optimal corrosion control treatment. According to state regulations (R325.604f (2) (iii), a system can demonstrate that it is "practicing optimal corrosion control" by sampling in two, consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the Flint River has 0 ppb lead, the city would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods.

In addition, the city of Flint had been purchasing water from DWSD that was treated for corrosion control. It was DWSD that was considered as having optimized corrosion control at that point. Since the city of Flint had not been the supplier of water before, DEQ did not require the city to "maintain" corrosion control for which it was not responsible. It couldn't "maintain" something that it wasn't doing. As we stated previously, we believed Flint should have been afforded the same opportunity that all other large water systems were

initially granted to demonstrate optimal corrosion control treatment through full scale monitoring. For these reasons, two 6-month rounds of monitoring, as required by the lead/copper rule were felt to be appropriate to determine whether or not optimal corrosion control was being achieved.

7. How does DEQ calculate the 90th percentile?

To determine the 90th percentile of a list of lead or copper results, the following steps are followed:

Step 1: Place lead or copper results in ascending order
Step 2: Assign each sample a number, 1 for lowest value
Step 3: Multiply the total number of samples by 0.9 – this yields the 90th percentile sample. For example: 20 samples x 0.9 = 18th sample. This is the 90th percentile level.

Calculating the 90th percentile is easiest when a supply collects 10 samples (or a multiple of 10). Multiples of 10 require no averaging or interpolation.

8. What was the result of the first round of monitoring conducted by Flint?

The first 6-month round of lead and copper monitoring conducted by the city of Flint ended on December 31, 2014. One hundred samples ~~100 samples~~ were submitted and the 90th percentile lead level was calculated to be 6 parts per billion.

A 90th percentile lead result of 6 ppb is not unusual. Many water supplies in Michigan and across the country have 90th percentile levels of lead greater than this. Even systems that have installed treatment and are considered optimized by definition can and do have levels above 5 ppb.

9. What was the result of the second round of monitoring conducted by Flint?

The second 6-month round of lead and copper monitoring conducted by the city of Flint ended on June 30, 2015. Sixty nine samples were submitted and the 90th percentile lead level was calculated to be 11 parts per billion. The conclusion from these results was that the city exceeded the level required to be deemed as having optimized corrosion control but did not exceed the action level of 15 parts per billion.

10. What actions did DEQ order Flint to undertake after the second round of monitoring?

While the City's LCR compliance monitoring continued to meet action level requirements, the LCR requires all large systems (those serving over 50,000 people) to optimize corrosion control regardless of their 90th percentile lead concentration. Following receipt of Flint's compliance monitoring results, the DEQ required the city to install corrosion control treatment in correspondence dated August 17, 2015.

Under the LCR, the city has 6 months to let the DEQ know whether it intends to conduct a study, 18 months to perform the study, and 24 months to complete installation of corrosion control. The DEQ has requested the city of Flint to accelerate this schedule. The city submitted plans and specifications to install corrosion control treatment and a construction

permit was issued by DEQ on October 28, 2015. The City is in the process of installing the necessary equipment and procuring the appropriate chemicals. Treatment is expected to be on-line by the end of November.

11. What had DHHS advised DEQ regarding blood lead levels prior to DEQ ordering Flint to implement optimized corrosion control?

In an e-mail dated July 28, 2015, DHHS indicated that they "compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –

- Lead testing rates remained about the same from year to year (chart on the right).
- There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).
- However that pattern was not terribly different from what we saw in the previous three years, especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).
- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspect that the summer data spike may be related to this effect.
- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015."

Insert GRAPHS?

This e-mail in concert with the completion of two 6-month rounds of lead compliance sampling data indicating that the City of Flint had not exceeded an action level for lead provided the basis for DEQ to maintain that the water in Flint continued to be in compliance with the SDWA and was safe for consumption.

12. When did DEQ first become aware of allegations of elevated blood levels being detected in certain children?

The DEQ was notified on August 23, 2015 by a professor from Virginia Tech that "over the next few months we will be studying Flint water quality issues..." and similarly notified by U.S. EPA on August 28, 2015. Results indicating elevated lead levels in homes were reported as part of this study in late August.

By this time, the City of Flint had already completed the required two 6-month rounds of monitoring and a determination had been made by the DEQ that the City must install corrosion control treatment in

[Hurley and Edwards all after the fact]

VI. **Questions raised regarding DEQ's actions**

1. **What was DEQ's response to EPA's inquiry in February 2015 regarding the optimized corrosion control treatment being implemented by Flint under the LCR?**

DEQ indicated that the city was in compliance with the lead/copper rule. 90th percentile levels were below the Action Level and not unusual. The city was already conducting the second round of monitoring which would provide for a determination of whether or not second round of monitoring which would provide for a determination of whether or not additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the lead/copper rule that lead or copper results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile action level in the rule.

2. **Did DEQ attempt to mislead EPA in a February 27, 2015 email responding to EPA's inquiry regarding OCCT?**

No. There is an e-mail from Steve Busch indicating that the city was practicing corrosion control. This was a misstatement. What was meant was that the city was performing the required monitoring to determine whether or not they were "practicing optimal corrosion control". It was clarified in follow-up telephone conversations with EPA.

3. **Has EPA subsequently admitted that the LCR is subject to differing interpretations such as that presented by DEQ?**

On November 3, 2015, U.S. EPA issued a Memorandum regarding the "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems". This memorandum addresses concerns raised about the application of the LCR, specifically the requirements pertaining to maintenance of optimal corrosion control treatment, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. The memo states that this type of situation rarely arises, that the language of the LCR does not specifically discuss such circumstances, and that there are differing possible interpretations of the LCR with respect to how the rule's optimal corrosion control treatment procedures apply to this situation. The memo is intended to clarify prospectively steps agencies should take/apply in the future.

4. **Did DEQ reject any of the samples submitted by Flint?**

Yes, samples at two locations were excluded from the compliance calculation.

Compliance samples must be a first draw, 1 liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted sampling sites, called tier 1 sampling sites. For a municipality such as the City of Flint, the tier 1 sampling pool must consist of single family structures that are:

- served by a lead service line,
- contain lead pipes, or
- contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

Furthermore, if a community has tier 1 sites that contain lead services, they are required to have at least 50% of their compliance samples collected from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters, etc. One of the samples submitted by Flint that was excluded from the 90th percentile compliance calculation in the latest monitoring period was taken from a tap at a non-residential site, and the other sample result that was removed was collected from a single family home that has whole house treatment system (check with Steve). Both of these sites are therefore statutorily excluded from the compliance consideration. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point of use or point of entry treatment can only be used if the community has insufficient tier 1 sites available.

5. **Did DEQ review the information submitted by Flint to ensure all samples were from Tier 1 sites?**

6. **Did DEQ believe the levels of lead found at 212 Browning in April 2015 were indicative of a system-wide problem?**

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The reason for this connection is unknown. The city replaced the lead service line. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem. Subsequent sampling taken at this address showed that replacement of the service line mitigated the problem. There was also no reason to believe that this was indicative of a system-wide problem.

7. **Do DEQ's sampling instructions comply with the LCR?**

8. **Does DEQ require the use of small-neck bottles to obtain samples?**

9. **Why was Flint required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?**

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of the Michigan SDWA.

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples Flint was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census (check with Steve), which listed the city's population as more 100,000 residents. In March of 2015, the city provided an updated census that indicated the city's population had decreased to less than 100,000 (check with Steve). Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

10. Why did DEQ admit it made a mistake?

Add GH –

Background –

Prior to switching from DWSD, the city of Flint operated a water treatment plant as a standby, backup emergency plant for purposes of reliability in the event that the single pipeline from DWSD failed.

In 2009, the water treatment plant was operated in this emergency capacity in two instances (dates/number of days). As a backup emergency plant, the city was required to operate the plant quarterly to demonstrate the ability to produce safe water in accordance with Act 399 and to keep mechanical equipment in good working order, such as valves, rubber seals, etc. Each time the plant was test run quarterly, samples were taken of raw water quality (describe here) and of finished water (post-filters). Treated water was not put into the distribution system during these test runs, but rather was discharged to the river in accordance with a NPDES Permit (confirm with Steve). The test runs were for demonstration purposes only and to keep the plant operational and staff familiar with operation in the event it was needed in an emergency.

Do we want to note that the original decision was to join KWA and begin receiving water in ~3 years from Lake Huron? It wasn't until DWSD issued a termination notice that caused the city to consider relying on the Flint River in the interim because they could not agree on a contract extension with Detroit.

April 2014: Flint terminates service from DWSD and begins using their water treatment plant full time.

What approvals from DEQ were required to do this?

Because Flint had long ago been issued construction permits for raw water pumps to withdraw water from the Flint River, the city was grandfathered under the Water Withdrawal program as were all existing community public water systems. There were no additional DEQ permissions required.

Under Act 399, Michigan's Safe Drinking Water Act, there are no licenses or permit required to operate. Two construction permits were issues prior to the treatment plant changing from an emergency back-up plant to a full time operation. These permits were for small changes such as new chemical feed equipment, changes to the electrical service, etc.

Summer 2014: Flint experiences several (how many?) water main breaks and has 2 localized (describe) boil water events.

Do we mention the unusually harsh winter that led to an increased number of water main breaks throughout Michigan that year?

Is it unusual for a city to issue boil water advisories? Should the state have been concerned at this point?

During the summer, the city was actively repairing the distribution system. After the switch to the Flint River, it was discovered that there were (how many) broken or closed valves in the city's distribution system. As the city began correcting this problem they did experience issues of bacteria in the distribution system as a result of the repairs.

– DAP2 –

This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

Complaints are being made that there are taste, odor, and color issues since the switch from DWSD; including rashes and hair falling out. Why didn't the state do something?

DEQ consulted with the city regarding these complaints. The city indicated that they were offering testing for anyone that had issues and that they were not able to verify the complaints. Jugs of discolored water were being brought to meetings, but city personnel were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHM's, it was anticipated that there would be short term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) can and will cause temporary problems as described. Based on information from the city personnel, it appeared that the complaints were related to operational activities occurring in the distribution system.

Late Summer 2014: Monitoring for TTHM's in the distribution system identifies that the city has elevated levels and will violate the MCL for TTHM's in subsequent monitoring.

How was this handled? Should this have been a sign that it was a mistake to "allow" Flint to switch from DWSD to the Flint River?

Because the water treatment plant was originally upgraded for intermittent, emergency use, it was not possible to predict Disinfection Byproduct formation until the city began relying on it continuously. The Flint River had higher levels of organic material and it was not a surprise that the water produced by the city of Flint developed higher disinfection by-products. TTHMs and HAA5s are the result of organic material in the water reacting with the disinfectant. On more than one occasion, DEQ district supervisors and engineers have indicated that continuous use of the Flint River poses an increased microbial risk and an increased risk of disinfection byproducts; will trigger additional regulatory requirements for monitoring; and require significant enhancements at the Flint Water Treatment Plant.

In preparation to rely on the Flint River, the city installed ozone to help reduce the organic material (known as precursors), but additional measures were necessary. Because TTHM and HAA5 MCLs are calculated based on a running annual average at a specific location, the city didn't actually violate the safe drinking water act standard until the fall, but because it was apparent in the summer of 2014 that the standard would eventually be exceeded, the city was asked to proactively implement measures to address the problem before the violation required them to do so. The city added granular activated carbon to their filters (after receiving a construction permit from DEQ on date?) and levels of TTHMs and HAA5s were reduced. The city returned to compliance with the running annual average (MCL) on (date?).

What is the role of DEQ as a regulatory agency implementing the Michigan Safe Drinking Water Act?

What is the role of the City of Flint in water system operation and providing safe drinking water?

Issues around lead/copper:

Why didn't DEQ require a corrosion control plan from the city prior to bringing the water treatment plant on-line in April 2014?

DEQ believed there were two ways under the lead/copper rule to deem a water supply as providing "optimal corrosion control" – either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment. DEQ staff thought it was appropriate to call for the city of Flint to perform two 6-month rounds of monitoring to demonstrate if the city was practicing optimal corrosion control treatment. According to state regulations (R325.604f (2) (iii), a system can demonstrate that it is "practicing optimal corrosion control" by sampling in two, consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the Flint River has 0 ppb lead, the city would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods.

In addition, the city of Flint had been purchasing water from DWSD that was treated for corrosion control. It was DWSD that was considered as having optimized corrosion control at that point. Since the city of Flint had not been the supplier of water before, DEQ did not require the city to "maintain" corrosion control for which it was not responsible. It couldn't "maintain" something that it wasn't doing. As we stated previously, we believed Flint should have been afforded the same opportunity that all other large water systems were initially granted to demonstrate optimal corrosion control treatment through full scale monitoring. For these reasons, two 6-month rounds of monitoring, as required by the lead/copper rule were felt to be appropriate to determine whether or not optimal corrosion control was being achieved.

The first round of monitoring conducted July 2014 through December 2014 resulted in a 90th percentile of 6 ppb lead. Why didn't the DEQ require the city take actions at this point?

A 90th percentile lead/copper result of 6 ppb for lead is not unusual. Many water supplies in Michigan and across the country have 90th percentile levels of lead greater than this. Even systems that have installed treatment and are considered optimized by definition can and do have levels above 5 ppb.

In February, EPA staff inquired about corrosion control and whether the city was providing treatment to control corrosion. What was the DEQ's response?

DEQ indicated that they city was in compliance with the lead/copper rule. 90th percentile levels were below the Action Level and not unusual. The city was already conducting the second round of monitoring which would provide for a determination of whether or not additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the lead/copper rule that

lead or copper results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile action level in the rule.

An e-mail from Steve Busch indicated that the city was practicing corrosion control. Why was this said?

This was a misstatement. What was meant was that the city was performing the required monitoring to determine whether or not they were "practicing optimal corrosion control". It was clarified in follow-up telephone conversations with EPA.

In April, EPA staff visited Flint and sampled a residence at 212 Browning. High levels of lead were present. Why wasn't this seen as a potential system-wide problem?

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The reason for this connection is unknown. The city replaced the lead service line. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem. There was also no reason to believe that this matter was anything other than a site specific condition. (may not be so unique in terms of Pb levels)

A draft memo, dated June 24, 2015, from an EPA staff person claimed that DEQ had inappropriately handled the sampling at the city and that corrosion control should have been required before start up. What is DEQ's response to these allegations?

DEQ never received this memo and it is our understanding that EPA never sent us this memo. A copy of the draft document was downloaded from the ACLU website. On June 30th, an e-mail was received from EPA that indicated it was a draft memo that had been shared with the homeowner where sampling occurred and that once management had a chance to review the memo they would provide a final copy to DEQ. A final copy was never received. Also, EPA indicated in this same e-mail that a conference call to discuss the issues raised in the memo was scheduled for July 21st between the agencies.

During the July 21st call, EPA provided a rule citation (for the first time) indicating that ..... DEQ provided their interpretation of the lead/copper rule. EPA indicated that they would consult with their attorneys and seek a clarification regarding the two different interpretations. To date (October 20th), DEQ has not received any feedback from EPA regarding the state's interpretation.

There is on-going criticism that the DEQ provides inappropriate guidance to water supplies regarding pre-flushing of taps prior to lead/copper sampling? Explain DEQ's rationale for doing this.

The lead/copper sampling protocol is designed to standardize sample collection and is not the same protocol that would be used for an exposure assessment. Different sampling is done for different purposes.

Under the lead/copper rule, samples collected must be 'first-draw' 1 liter samples collected from kitchen or bathroom taps at EPA designated, high-risk locations after

overnight stagnation. It is recognized that this may or may not be the highest level of lead that could be found at a residence. However, it does provide the water supplier with information about efficacy of their treatment process and an indication of how the water may be reacting with plumbing in the system.

The lead/copper rule is the only rule that requires compliance monitoring to be performed by homeowners. In order to simplify the instructions and ensure consistent sampling protocol and results, DEQ recommends that a sample tap/outlet be run the night before it is going to be sampled so that the sampling location is representative of a tap experiencing typical household use (as required by the lead/copper rule). Historically, there were problems with homeowners sampling from locations that had not been used for days, weeks or even months. The recommended/required stagnation period under the lead/copper rule is 6 to 18 hours. To accomplish this across the board, DEQ policy is to recommend that the tap be used or use be simulated on the night before it is going to be sampled. EPA has incorporated similar sampling protocols into tap sampling programs at schools and day care centers. (do we want to provide a footnote with a citation to the Milwaukee Westlawn CARE Project?)

If there is a lead service line in the house, then a first draw sample under this condition will not contain water that has sat stagnant for some time in that service line. However, flushing the tap the night before will not likely result in capturing a first draw sample that has sat stagnant in that lead service line because only the tap that is going to be sampled is required to be stagnant. If there is a toilet or a dishwasher nearby, they can still be used. And it is impossible to predict whether there is water in that particular line that has spent any time at all resting quietly for any period of time in the service line and only happens to be poised for withdrawal at that particular tap at that particular moment. Only a site specific evaluation of a household plumbing system along with a site specific calculation of the volume of water in the plumbing system and the volume of water in the lead service line would potentially provide for a sample that has rested in the service line assuming that no water has been used in the house during the entire time of "resting". This level of complexity is not a practical approach for a community to employ or for water systems across the country to accomplish when they must rely upon homeowners to collect samples. The lead/copper rule is imperfect. But the instructions provided by DEQ provide for a consistent sampling protocol that is easily followed by homeowners and results in samples collected that meet the legal requirements of the lead/copper rule and the intention of providing water quality information upon which further regulatory decisions should be made. The lead/copper rule is intended to assist water suppliers with evaluating their treatment process and the effects of the water on plumbing systems. It is not a tool to assess individual exposure.

After the July 21st call with EPA where they provided a regulatory citation and their opinion that the DEQ had not followed the required protocol to require treatment, what steps were taken by DEQ to address the situation?

By the time the July 21st call occurred, the city had completed their two 6-month rounds of lead/copper monitoring. This monitoring showed that the city needed to install corrosion control measures. On August 17th, the DEQ wrote the city requiring the city to perform a study and install corrosion control treatment in accordance with the safe drinking water act. We also recommended Flint significantly accelerate this action and not take the time allotted by the regulations for selecting and installing OCCT.

When DEQ met with city residents on August 4th, they were still saying that the water was safe even after the sampling was done and it showed that corrosion control was necessary. Why the contradiction?

At the time of this meeting, all sampling results to date indicated that lead levels were within typical ranges seen in other water systems and below the Action Level established in the rule. It was acknowledged that the results showed that the city of Flint needed to provide optimal corrosion control treatment and that would soon be required. In addition, data provided by our colleagues at the Department of Health and Human Services indicated that there was no significant change in children's blood lead levels within the city. The evaluation showed that blood lead levels were following historical seasonal patterns and there was no indication of a water contributing to an increase. This provided backup confirmation (at that time) that the path followed was correct.

When the V-T researcher raised the alarm on (date) that the sampling required by DEQ was wrong and that levels of lead in the city were much higher than previously thought, why didn't DEQ investigate these claims and follow up on this information?

DEQ was informed in late August that a study was underway in the city and that samples taken appeared to be much higher than those taken under the lead/copper rule. Since we were not provided information regarding protocol used for the study, the DEQ could not adequately comment on the comparison between the two data sets. It was not however, unexpected that a different sampling protocol could yield higher results. Since the required two 6-month rounds of monitoring had already been completed at this point and the city had been notified of the requirement to install treatment, there were no additional actions deemed necessary by the agency at this point. The city had not exceeded the lead action level, they were actively pursuing treatment on an accelerated schedule, and DHHS information regarding blood lead levels in the city indicated that there was NO significant change since the switch.

Why did DEQ change their position in September and agree that lead is a problem in Flint?

As soon as the DHHS Chief Medical Officer determined that there was a correlation between blood lead levels in children in certain zip codes and the switch to the Flint River, DEQ responded. Actions were taken within a week to address the concerns raised.

Why is DEQ admitting it made a mistake?

If EPA's interpretation is correct and the city of Flint was required to maintain corrosion control and should not have been allowed to switch sources without maintaining corrosion control, this wasn't done. All indications are that the protective coating that was in place as a result of treated water received from DWSD has been eroded and that lead leaching has increased during the time that there hasn't been treatment. This was the mistake. However, DEQ staff acted in good faith. They believed that they were implementing the lead/copper rule appropriately with all of its nuances in sampling and limitation on compliance monitoring. The lead/copper rule establishes a mechanism for a new supply (when not previously serving water to the public) to conduct two 6-month rounds of monitoring to determine whether or not the supply can be deemed optimal by definition or whether treatment must be installed. It did not anticipate a system serving

greater than 50,000 residents would disconnect from a regional supply to become its own supply with a new source and different treatment methods. It was these circumstances for which DEQ employees were sincerely applying regulations as they interpreted them to ensure compliance and public health protection.

Why was Flint required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of the Michigan Safe Drinking Water Act (Act 399, PA 1976, as amended).

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples Flint was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census (*check with Steve*), which listed the city's population as more 100,000 residents. In March of 2015, the city provided an updated census that indicated the city's population had decreased to less than 100,000 (*check with Steve*). Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

Why were some sample results submitted by the City of Flint during the latest monitoring period excluded from the 90th percentile compliance calculation?

Compliance samples must be ~~1-liter in volume and be~~ a first draw, 1 liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted sampling sites, called tier 1 sampling sites. For a municipality such as the City of Flint, the tier 1 sampling pool must consist of single family structures that are:

- served by a lead service line,
- contain lead pipes, or
- contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

Furthermore, if a community has tier 1 sites that contain lead services, they are required to have at least 50% of their compliance samples collected from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters,

etc. One of the samples submitted by Flint that was excluded from the 90th percentile compliance calculation in the latest monitoring period was taken from a tap at a non-residential site, and the other sample result that was removed was collected from a single family home that has point of use treatment (*check with Steve*). Both of these sites are therefore statutorily excluded from the compliance consideration. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point of use or point of entry treatment can only be used if the community has insufficient tier 1 sites available.

Although we already addressed the issue of why we did what we did in the first question after the "Issues around lead/copper," the following citation and explanation may be useful if needed to answer additional questions or ones we haven't yet asked:

Rule 325.l1064(f) (2) (D) (iii) says, "A water supply is considered to have optimized corrosion control if it submits results of tap water monitoring conducted under R 325.10710a and source water monitoring conducted under R 325.10710c that demonstrates, for 2 consecutive 6-month monitoring periods, that the difference between the ninetieth percentile tap water lead level computed under subrule (1)(c0) of the rule and the highest source water lead concentration is less than the practical quantification level (PQL) for lead. *(This is the procedure we were applying to Flint as they became a supplier and not just a consecutive system receiving finished water)* In addition, all of the following provisions apply:

(A) A supply whose highest source water lead level is below the method detection limit is considered to have optimized corrosion control under this paragraph if the supply's ninetieth percentile tap water lead level is less than or equal to the PQL for lead (which is 5 ppb) for 2 consecutive 6-month monitoring periods.

(B) A water supply considered to have optimized corrosion control under this paragraph shall continue monitoring for lead and copper at the tap not less frequently than once every 3 calendar years using the reduced number of sites specified in R 325.10710a(3) and collecting the samples at times and locations specified in R325.10710a(4)(d)(iv).

(C) A water supply is considered to have optimized corrosion control under this subdivision shall notify the department, in writing, under R325.10710d(a)(iii) of an upcoming long-term change in treatment or addition of a new source as described in that subdivision. The department shall review and approve the addition of a new source or long-term change in water treatment before it is implemented by the water supply. The department may require the supply to conduct additional monitoring or to take other action the department considers appropriate consistent with the requirements of R325.10604f(2) to ensure the supply maintains minimal levels of corrosion in the distribution system.

(D) & (E)……(lots more but not germane to the discussion)

Subparagraph (C) raises the issue of why Flint's change in source and treatment did not trigger additional department actions. One explanation has to do with whether the City of Flint was *"considered to have optimized corrosion control."* ODWMA staff did not consider Flint or any of the almost 300 other consecutive, customer water systems in Michigan that only receive and distribute finished water to be responsible for corrosion control treatment. It has been our practice to consider treatment of water to be the responsibility of the wholesale supplier, in this case DWSD. Therefore, this rule was not

considered applicable. Another explanation is that Flint already had authority to use the Flint River based on historic permits and periodic emergency use, so the city was not required to seek DEQ approval for a "new" source. And like every other large water system that initially came under the jurisdiction of the lead and copper rules, we were applying the overall procedure described in the above paragraph above subparagraphs (A) through (E) that allowed a system to demonstrate whether their current treatment methods were already deemed optimal. When the LCR was first implemented, numerous systems exceeded the lead action level of 15 ppb and wholesale suppliers had to optimize the corrosion control treatment. Under the regulatory framework allowed, some systems went 4 or more years before they had optimized their corrosion control, and in some cases, it took longer for it to take full effect in all of the consecutive customer supplies.

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604f(2)(a) A supply shall complete the applicable corrosion control treatment requirements described in subrule (3) of this rule by the deadlines established in this rule. A large water supply (serving more than 50,000 persons) shall complete the corrosion control treatment steps specified in subdivision (d) of this subrule, unless the supply is considered to have optimized corrosion control under subdivision (b)(ii) or (iii) of this subrule. A small water system (serving 3,300 or fewer persons) and a medium size water system (serving more than 3,300, but fewer than 50,001 persons) shall complete the corrosion control treatment steps specified in subdivision (e) of this subrule unless the supply is considered to have optimized corrosion control under subdivision (b)(i), (ii), or (iii) of this subrule.	Applies because system >50,000.
604f(2)(b) A supply is considered to have optimized corrosion control and is not required to complete the applicable corrosion control treatment steps identified in subrule (3) of this rule if the supply is in compliance with 1 of the criteria specified in paragraphs (i) to (iii) of this subdivision. A supply which is considered to have optimized corrosion control under this subdivision and which has treatment in place shall continue to operate and maintain optimal corrosion control treatment and meet the requirements that the department determines appropriate to ensure optimal corrosion control treatment is maintained. All of the following provisions apply to being considered to have optimized corrosion control: (i) A small or medium size water supply is considered to have optimized corrosion control if the supply is in compliance with the lead and copper action levels during each of 2 consecutive 6-month monitoring periods during which monitoring is conducted under R 325.10710a. (ii) A water supply may be considered by the department to have optimized corrosion control treatment if the supply demonstrates, to the satisfaction of the department, that it has conducted activities equivalent to the corrosion control steps applicable to the system under subrule (3) of this rule. Supplies considered to have optimized corrosion control under this subdivision shall operate in compliance with the department designated optimal water quality control parameters under subrule (3)(g) of this rule and continue to conduct lead and copper tap and water quality parameter sampling under R 325.10710a(4)(c) and R 325.10710b(4), respectively. A supply shall provide the department with all of the following information to support a determination under this subdivision: (A) The results of all test samples collected for each of the water quality parameters specified in subrule	[redacted]: Treat as a new system or require system to maintain optimization because it was previously purchasing optimized water. EPA: Because the system had received optimized water, it was required to MAINTAIN that optimization. DEQ: While the system did previously receive the benefit of optimized water, it did not employ the optimization itself, so could not maintain what it did not have. Instead the new source/WTP were treated as a new, not yet optimized, system and required to begin optimization steps from the beginning.

(3)(c)(iii) of this rule.

(B) A report that explains the test methods used by the water supply to evaluate the corrosion control treatments listed in subrule (3) of this rule, the results of all tests conducted, and the basis for the supply's selection of optimal corrosion control treatment.

(C) A report that explains how corrosion control has been installed and how it is being maintained to ensure minimal lead and copper concentrations at consumers' taps.

(D) The results of tap water samples collected under R 325.10710a at least once every 6 months for 1 year after corrosion control has been installed.

(iii) A water supply is considered to have optimized corrosion control if it submits results of tap water monitoring conducted under R 325.10710a and source water monitoring conducted under R 325.10710c that demonstrates, for 2 consecutive 6-month monitoring periods, that the difference between the ninetieth percentile tap water lead level computed under subrule (1)(c) of this rule and the highest source water lead concentration is less than the practical quantitation level for lead. In addition, all of the following provisions apply:

(A) A supply whose highest source water lead level is below the method detection limit is considered to have optimized corrosion control under this paragraph if the supply's ninetieth percentile tap water lead level is less than or equal to the practical quantitation level for lead for 2 consecutive 6-month monitoring periods.

(B) A water supply considered to have optimized corrosion control under this paragraph shall continue monitoring for lead and copper at the tap not less frequently than once every 3 calendar years using the reduced number of sites specified in R 325.10710a(3) and collecting the samples at times and locations specified in R 325.10710a(4)(d)(iv).

(C) A water supply considered to have optimized corrosion control under this subdivision shall notify the department, in writing, under R 325.10710d(a)(iii) of an upcoming long-term change in treatment or addition of a new source as described in that subdivision. The department shall review and approve the addition of a new source or long-term change in water treatment before it is implemented by the water supply. The department may require the supply to conduct additional monitoring or to take other action the department considers appropriate consistent with the requirements of R 325.10604f(2) to ensure that the supply maintains minimal levels of corrosion in the distribution system.

(D) As of July 12, 2001, a supply is not considered to have optimized corrosion control under this subdivision, and shall implement corrosion control treatment under subparagraph (E) of this paragraph unless it meets the copper action level.

(E) A supply that is no longer considered to have

DEQ: Supplies can demonstrate optimization by meeting the PQL per 604f(2)(b)(iii). System was given this opportunity via 2 6-month rounds of standard tap monitoring.

EPA: When first round was 6 (not meeting PQL), why not begin study?

[redacted]: Why allow a 2nd 6-month round when first round did not meet PQL requirement?

next DEQ meeting

DEQ: DEQ was notified of the change. Because no prior tap monitoring data was available that represented the new source/WTP conditions, DEQ determined the appropriate action was to conduct additional monitoring to assess 604f(2)(b)(iii) applicability.

optimized corrosion control under this subdivision shall implement corrosion control treatment under the deadlines in subdivision (e) of this subrule. A large water supply shall adhere to the schedule specified in that subdivision for medium size water supplies, with the time periods for completing each step being triggered by the date the supply is no longer considered to have optimized corrosion control under this subdivision.	DEQ: Once monitoring demonstrated optimization could not be achieved by meeting the PQL requirement under 604f(2)(b)(iii), DEQ immediately notified the supply of the requirement to implement corrosion control treatment per 604f(2)(b)(iii)(E).
(c) If a small or medium size water supply exceeds the lead or copper action level and the supply is required to perform the corrosion control treatment steps, the supply may cease completing the treatment steps when the supply is in compliance with both action levels during each of 2 consecutive monitoring periods conducted under R 325.10710a and the supply submits the results to the department. If the supply thereafter exceeds the lead or copper action level during a monitoring period, the supply shall recommence the applicable treatment steps beginning with the first treatment step that was not previously completed in its entirety. The department may require a supply to repeat treatment steps that were previously completed by the supply if the department determines that this is necessary to properly implement the treatment requirements of this rule. The department shall notify the supply in writing of the determination and explain the basis of the decision. If a small or medium size water supply exceeds the lead or copper action level, the supply, including supplies considered to have optimized corrosion control under subdivision (b) of this subrule, shall implement corrosion control treatment steps under subdivision (e) of this subrule. (d) Except as provided in subdivision (b)(ii) and (iii) of this subrule, a large water supply shall complete all of the following corrosion control treatment steps by the indicated dates: (i) Step 1: A supply shall conduct initial monitoring during 2 consecutive 6-month monitoring periods by January 1, 1993. (ii) Step 2: A supply shall complete corrosion control studies by July 1, 1994. (iii) Step 3: By January 1, 1997, a supply shall install optimal corrosion control treatment as designated by the department. (iv) Step 4: A supply shall complete follow-up sampling by January 1, 1998. (v) Step 5: A supply shall operate in compliance with the department specified optimal water quality control parameters and continue to conduct tap sampling. (e) Except as provided in subdivision (b) of this subrule, small and medium size water supplies shall complete all of the following corrosion control treatment steps by the indicated time periods: (i) Step 1: A supply shall conduct initial tap sampling under R 325.10604f(3)(a) until the supply either	Corrosion control schedule for large systems found to no longer have OCCT.

exceeds the lead or copper action level or becomes eligible for reduced monitoring. The supply that exceeds the lead or copper action level shall recommend optimal corrosion control treatment within 6 months after the end of the monitoring period during which it exceeds 1 of the action levels. (ii) Step 2: Within 12 months after the end of the monitoring period during which a supply exceeds the lead or copper action level, the department may require the supply to perform corrosion control studies under subdivision (3)(b) of this rule. If the department does not require the supply to perform the studies, the department shall specify optimal corrosion control treatment under subdivision (3)(d) of this rule within the following timeframes: (A) For medium-size supplies, within 18 months after the end of the monitoring period during which the supply exceeds the lead or copper action level. (B) For small supplies, within 24 months after the end of the monitoring period during which the supply exceeds the lead or copper action level. (iii) Step 3: If the department requires a supply to perform corrosion control studies under subdivision (3)(b) of this rule, the supply shall complete the studies within 18 months after the department requires that the studies be conducted. If the supply has performed corrosion control studies under paragraph (ii) of this subdivision, the department shall designate optimal corrosion control treatment under subdivision (3)(d) of this rule within 6 months after completion of the corrosion control studies. (iv) Step 4: A supply shall install optimal corrosion control treatment within 24 months after the department designates the treatment. (v) Step 5: A supply shall complete follow-up sampling under R 325.10710a(4)(b) within 36 months after the department designates optimal corrosion control treatment. The department shall review the supply's installation of treatment and designate optimal water quality control parameters under R 325.10604f(3)(d)(ii) within 6 months after the supply's completion of follow-up sampling. (vi) Step 6: A supply shall operate in compliance with the department designated optimal water quality control parameters under R 325.10604f(3)(d)(ii) and continue to conduct tap sampling under R 325.10710a(4)(c) and R 325.10710b(6).	
(3) A water supply shall complete all the corrosion control treatment requirements described in this subrule that are applicable to the system under subrule (2) of this rule. All of the following apply: (a) Based on the results of lead and copper tap monitoring and water quality parameter monitoring, small and medium size water systems that exceed the lead or copper action level shall recommend the	This is what comes next. Completing the requirements, setting and maintaining ranges, etc.

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installation of 1 or more of the corrosion control treatments listed in subdivision (c)(i) of this subrule that the supply believes constitutes optimal corrosion control for that system. The department may require the supply to conduct additional water quality parameter monitoring under R 325.10710b(4) to assist the department in reviewing the supply's recommendation.

(b) When required by the department, a small or medium size water supply that exceeds the lead or copper action level shall perform corrosion control studies under subdivision (c) of this subrule to identify optimal corrosion control treatment for the supply.

(c) Perform corrosion control studies as follows:

(i) A water supply that performs corrosion control studies shall evaluate the effectiveness of each of the following treatments and, if appropriate, combinations of the following treatments to identify the optimal corrosion control treatment for that supply:

(A) Alkalinity and pH adjustment.

(B) Calcium hardness adjustment.

(C) The addition of a phosphate or silicate based corrosion inhibitor at a concentration sufficient to maintain an effective residual concentration in all test tap samples.

(ii) The water supply shall evaluate each of the corrosion control treatments using pipe rig/loop tests, metal coupon tests, partial system tests, or analyses based on documented analogous treatments with other water supplies of similar size, water chemistry, and distribution system configuration.

(iii) A water supply shall measure all of the following water quality parameters in tests conducted under this paragraph before and after evaluating the corrosion control treatments listed in paragraph (i)(A) to (C) of this subdivision:

(A) Lead.

(B) Copper.

(C) pH.

(D) Alkalinity.

(E) Calcium.

(F) Conductivity.

(G) Orthophosphate, when an inhibitor containing a phosphate compound is used.

(H) Silicate, when an inhibitor containing a silicate compound is used.

(I) Water temperature.

(iv) The water supply shall identify all chemical or physical constraints that limit or prohibit the use of a particular corrosion control treatment and shall document the constraints with 1 or both of the following:

(A) Data and documentation demonstrating that a particular corrosion control treatment has adversely affected other water treatment processes when used by another water supply with comparable water quality characteristics.

(B) Data and documentation demonstrating that the

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supply has previously attempted to evaluate a particular corrosion control treatment and has found that the treatment is ineffective or adversely affects other water quality treatment processes.

(v) A water supply shall evaluate the effect of the chemicals used for corrosion control treatment in other water quality treatment processes.

(vi) On the basis of an analysis of the data generated during each evaluation, a water supply shall recommend, to the department, in writing, the treatment option that the corrosion control studies indicate constitutes optimal corrosion control treatment for that supply. The water system shall provide a rationale for its recommendation together with all supporting documentation specified in paragraphs (i) to (v) of this subdivision.

(d) Department designation of optimal corrosion control treatment shall be as follows:

(i) Based on consideration of available information, including, where applicable, studies performed under subdivision (c) of this subrule and a supply's recommended treatment alternative, the department will either approve the corrosion control treatment option recommended by the supply or will designate alternative corrosion control treatment from the treatment specified in subdivision (c)(i) of this subrule. When designating optimal treatment, the department shall consider the effects that additional corrosion control treatment will have on water quality parameters and on other water quality treatment processes.

(ii) The department shall notify the supply of its decision on optimal corrosion control treatment in writing and explain the basis for this determination. If the department requests additional information to aid its review, the water supply shall provide the information.

(e) Each supply shall properly install and operate, throughout its distribution system, the optimal corrosion control treatment designated by the department.

(f) The department shall evaluate the results of all lead and copper tap samples and water quality control parameter samples submitted by the water supply and determine whether the supply has properly installed and operated the optimal corrosion control treatment designated by the department in subdivision (d) of this subrule. Upon reviewing the results of tap water and water quality control parameter monitoring by the supply, both before and after the supply installs optimal corrosion control treatment, the department shall designate all of the following:

(i) A minimum value or a range of values for pH measured at each entry point to the distribution system.

(ii) If a corrosion inhibitor is used, a minimum concentration or a range of concentrations for the inhibitor, measured at each entry point to the distribution system, that the department determines is necessary to form a passivating film on the interior walls of the pipes

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of the distribution system.

(iii) If alkalinity is adjusted as part of optimal corrosion control treatment, a minimum concentration or a range of concentrations for alkalinity, measured at each entry point to the distribution system.

The department may designate values for additional water quality control parameters determined by the department to reflect optimal corrosion control for the supply. The department shall notify the supply in writing of these determinations and explain the basis for its decision.

(g) All supplies optimizing corrosion control shall continue to operate and maintain optimal corrosion control treatment, including maintaining water quality parameters at or above minimum values or within ranges designated by the department, under this subdivision for all samples collected under R 325.10710b(6) to (8). Compliance with the requirements of this subdivision shall be determined every 6 months, as specified under R 325.10710b(6). A water system is out of compliance with the requirements of this subdivision for a 6-month period if it has excursions for a department specified parameter on more than 9 days during the period. An excursion occurs when the daily value for 1 or more of the water quality parameters measured at a sampling location is below the minimum value or outside the range designated by the department. The department may delete results of obvious sampling errors from this calculation. Daily values are calculated as follows:

(i) On days when more than 1 measurement for the water quality parameter is collected at the sampling location, the daily value shall be the average of all results collected during the day regardless of whether they are collected through continuous monitoring, grab sampling, or a combination of both.

(ii) On days when only 1 measurement for the water quality parameter is collected at the sampling location, the daily value shall be the result of that measurement.

(iii) On days when a measurement is not collected for the water quality parameter at the sampling location, the daily value shall be the daily value calculated on the most recent day on which the water quality parameter was measured at the sample site.

(h) The department's determination of the optimal corrosion control treatment specified in subdivision (d) of this subrule or optimal water quality control parameters may be modified by the department. If a request for modification is by a supply or other interested person, the request shall be in writing, shall explain why the modification is appropriate, and shall provide supporting documentation. The department may modify its determination where it concludes that a change is necessary to ensure that the supply continues to optimize corrosion control treatment.

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710a(3) = monitoring chart	Q: Why did DEQ allow 60 samples the 2nd round, rather than 100? A: System population was below 100,000. Per 710a(3), only 60 sites were required.
710a(1) = sample site locations	Q: Why did DEQ exclude sample results from the 90th percentile calculation? A: Sample sites are selected per 710a(1) using a tiered protocol designed to target high risk locations. Excluded results were taken at sites that did not meet site selection criteria.

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Did DEQ review the information submitted by Flint to ensure all samples were from Tier I sites?

Yes. DEQ examined the information submitted and certified by the city that their LCR sampling pool consisted entirely of lead service lines from single family homes, which met the requirements of this rule to maximize sampling of high risk targeted sites.

During the initial implementation of the LCR approximately 25 years ago, water supplies were required to complete a materials evaluation of their distribution system to identify a pool of targeted, high-risk sampling sites. These sites were to be categorized into one of three tiers (I, II or III) based on risk. DEQ created a LCR reporting template for water systems to identify each compliance sampling site by Tier, and if they are in the highest Tier (1), to indicate why these sites qualify by having a lead service line, or because they either have copper piping installed with high lead content solder or they have lead plumbing in the home.

If a water system has sufficient Tier 1 sites, they are required to sample them before using any lower Tier sites. Furthermore, if they have sufficient sampling sites with lead service lines, they are required to use them to make up at least 50% of their sampling pool each monitoring period. Water supplies are also required to use the same sampling sites each time or explain on their LCR reporting form why they were unable to do so. Finally, we require the water system to certify all of the information they provide on the LCR reporting form is factual.

DEQ must rely upon the public water system to identify appropriate sampling sites for LCR monitoring. The DEQ public water supply program has no control or authority over service lines or domestic plumbing. As a result, we have no records on construction standards or materials used by customers for these components. If these records exist, they are kept locally where they are reviewed and approved by local agencies such as building departments or plumbing inspectors.

In 2015, Flint employees again certified that the information submitted on their LCR monitoring reports for the two 6-month rounds of monitoring conducted after they began treating the Flint River were accurate, and staff review of that information indicated it was in compliance with the monitoring requirements. It was not until October of 2015 when we heard city employees revealing to the media that they did not know for certain if their compliance monitoring was collected from homes with lead service lines. As a result, we began to investigate their monitoring sites. As the city began to transfer their customer information to electronic records, DEQ determined from the information available that a significant number of these sites that had been listed as having lead service lines either did not have them or ~~it was indeterminate~~. ~~At that point~~, DEQ notified the city in writing that it would be necessary to conduct a complete assessment of their sampling pool and report back their findings within a month. We are now awaiting the city's report.

the information was unavailable.

On November 2, 2015

City of Flint Drinking Water

Outline prepared by the

Michigan Department of Environmental Quality for the

Flint Water Task Force

I. Introduction

This document is intended to provide an overview of Michigan's implementation of the Safe Drinking Water Act with respect to events in the City of Flint.

II. Background

1. How has Flint historically obtained its drinking water?

The water system in Flint, Michigan, was organized and built under private ownership in 1883 as the Flint Water Works Company to pump raw water from the Flint River to their consumers. In 1903, the system was converted to a municipally owned corporation which supplied drinking water to the City until 1967, ~~when~~ the City switched and become a customer of the Detroit Water and Sewerage Department (DWSD) system. After the switch to DWSD, the city of Flint operated their water treatment plant as a standby, backup emergency plant for purposes of reliability in the event that the single pipeline from DWSD was out of service for any reason.

In 2009, the water treatment plant was operated in this emergency capacity in two instances (dates/number of days). As a backup emergency plant, the city was required to operate the plant quarterly to demonstrate the ability to produce safe water in accordance with Michigan's Safe Drinking Water Act (1976 PA 399) and to keep mechanical equipment in good working order (such as valves, rubber seals, etc.) Each time the plant was test run quarterly, samples were taken of raw water quality (describe here) and of finished water (post-filters). Treated water was not put into the distribution system during these test runs, but rather was discharged to the river in accordance with a NPDES Permit (confirm with Steve). The test runs were for demonstration purposes only ~~and~~ to keep the plant operational and staff familiar with operation in the event it was needed in an emergency.

2. What State and Federal laws or rules must be complied with in order to ensure safe drinking water is provided to Flint residents?

The federal Safe Drinking Water Act (SDWA) is the primary law that ensures the quality of Americans' drinking water. Under the SDWA, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.

The federal SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. (SDWA does not regulate private wells which serve fewer than 25 individuals.)

The federal SDWA authorizes the United States Environmental Protection Agency (US EPA) to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants that may be found in drinking water. US EPA, states, and water systems then work together to make sure that these standards are met.

Originally, the SDWA focused primarily on treatment as the means of providing safe drinking water at the tap. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

The most direct oversight of water systems is conducted by state drinking water programs. States can apply to US EPA for "primacy," the authority to implement SDWA within their jurisdictions, if they can show that they will adopt standards at least as stringent as US EPA's and make sure water systems meet these standards. Michigan adopted the Safe Drinking Water Act in 1976 and maintained primacy for the program since 1978?

3. **What is EPA's role as a regulatory agency in implementing the SDWA?**

Federal and state governments share responsibility for administering drinking water programs. Under the Safe Drinking Water Act (SDWA), the U.S. Environmental Protection Agency (US EPA) is given the responsibility for developing national standards and regulations that apply to the nation's public drinking water systems and enforcing those standards.

Michigan's drinking water program is reviewed annually by U.S. EPA.

4. **What is DEQ role's as a regulatory agency in implementing the SDWA?**

SDWA also allows states to accept oversight of the drinking water program under an agreement with US EPA giving states primary enforcement (or primacy) responsibilities. In addition to this delegation of federal authority to the states, states also have the power to create additional regulations and programs governing drinking water suppliers through their own legislative and regulatory processes.

The DEQ has primary enforcement authority in Michigan for the Safe Drinking Water Act under the legislative authority of the Michigan Safe Drinking Water Act (Act 399). As such, the division has regulatory oversight for all public water supplies, including approximately 1,425 community water supplies and 10,000 noncommunity water supplies.

The State of Michigan DEQ engages in a variety of activities to help water systems remain in, or return to, compliance. These activities include: visiting water systems and reviewing their facilities, equipment, and operations; requiring the submission of plans and specifications for waterworks system improvements and issuing construction permits; providing for the examination, certification and regulation of persons operating water supplies; helping systems invest in preventive measures; providing financial assistance for system improvements; and conducting training sessions.

5. **What is Flint's role in implementing the SDWA?**

~~These federal and state programs are separate from the activities performed by water systems.~~ State and federal programs develop regulations and perform oversight and compliance activities, but do not actually treat or deliver water to customers. At the local level, public and private water utilities collect, treat, and deliver drinking water to consumers.

To ensure that drinking water is safe, SDWA sets up multiple barriers against pollution. These barriers include: source water protection, treatment, distribution system integrity, and public information. As a public water system, the city of Flint is responsible for ensuring that contaminants in tap water do not exceed the standards. The City treats the water, and must test their water frequently for specified contaminants and report the results to the State. If a water system is not meeting these standards, it is the water supplier's responsibility to notify its customers.

The SDWA recognizes that since everyone drinks water, everyone has the right to know what's in it and where it comes from. The City of Flint, like all water suppliers, must notify consumers quickly when there is a serious problem with water quality. Water systems serving the same people year-round must provide annual consumer confidence reports on the source and quality of their tap water.

The city of Flint submits samples of their water for laboratory testing (monitoring) to verify ~~that~~ the water they provide to residents meets all federal and state standards. How often and where samples are taken varies from system to system and contaminant to contaminant. The State provides an annual monitoring schedule to the City setting forth these requirements.

In addition, the city of Flint is required to maintain on staff, certified water operators that are trained and experienced to operate the treatment and distribution system associated with the city's water system.

III. **The Flint River – it is a safe source of drinking water?**

In Michigan, we are blessed with high quality drinking water sources. Seventy percent of Michigan's population receives its drinking water from surface water sources, most with intakes in the Great Lakes. A handful of public water supplies in Michigan do treat water from inland sources such as rivers or groundwater under the influence of surface water. While river sources present a greater challenge for

[Our impression is that the average citizen is under the impression that the river water is corrosive and contains lead – we can address no lead, chloride, and lime issues. Address treatment issues to show that water leaving the plant meet all SDWA

requirements. Ph was same as DWSD. Also sets up point that problems arose after water left plant and was disseminated throughout system]

IV. E. Coli and Total Coliform bacteria violations

1. What caused the E.Coli and Total Coliform bacteria violations experienced by Flint in August-September 2014?

A number of factors, not one specific cause, likely contributed to the Boil Water Advisories (BWA's) in the City of Flint during August and September 2014. While use of the Flint River increased the amount of natural organic matter in the City's water, the City's water treatment plant (WTP) performed well above treatment requirements for organic carbon removal. In addition, less than 20% of the water system was included in the advisory area. If treatment had been compromised, detections would have been widespread throughout the City, rather than in such a localized area.

The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of cast iron piping. Cast iron pipe is subject to internal corrosion, called tuberculation, which causes buildup on the pipe interior leading to water quality issues, reduced flow and pressures, and leakage. Tuberculation also encourages the development of biofilms, layers of bacteria that attach to the interior pipe wall. Biofilm growth is common in areas of piping with little or no disinfectant residual, and together with tuberculation can clog water lines to the point of insufficient water pressure.

The City has also experienced decades of a declining user base and water use associated with vacant homes, commercial businesses and industrial property. Declining water use leads to excess ~~residence~~ time within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and disinfectant residual degradation. While the City has recently seen an infusion of funding for blight removal, contractors completing this work have been improperly using fire hydrants, causing hydraulic disturbances that dislodged and suspended settled debris, which may have contributed to the bacterial contamination.

The winter of 2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30%, saw even greater losses since February due to an increase in cold weather related water main breaks and leaks. The City lacks a formal maintenance program for its over 7,250 valves, which would normally be used to limit impacts during break repairs. Two valves on the transmission line used to supply the area of the BWA were found to be closed during the City's investigation, causing longer residence time, reduced disinfectant residual, reduced flow, and reduced pressure.

The BWA's also occurred during the warmest and ~~for 2014~~ relatively wet periods of August and September. Warm weather conditions are not only more conducive to bacterial growth but also degrade the water's disinfectant residual carried out from the WTP more quickly. Longer residence times, biofilms, and tuberculation also contribute to disinfectant residual degradation. Warm wet weather conditions also allow water contaminated with bacteria to pool around piping with leaks and breaks.

During the summer, the city was actively repairing the distribution system. After the switch to the Flint River, it was discovered that there were many broken or closed valves in the city's distribution system. As the city began correcting this problem they did experience issues of bacteria in the distribution system as a result of the repairs. This sporadic detection is not an unusual occurrence. Many communities have experienced similar issues when significant repairs are made in the system and/or they suffer water main breaks and localized pressure losses.

2. How were the violations detected and what was DEQ's response?

The Boil Water Advisories (BWAs) which occurred in the City of Flint were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the City of Flint collaboratively in consultation with the DEQ.

Regulations regarding monitoring and standards for bacteria in water distribution systems were developed by the EPA, have been in effect since 1990, and incorporated into the Michigan Safe Drinking Water Act. There are a variety of bacteria, parasites, and viruses which can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, water systems test for Total coliform and E.coli. Total coliform bacteria react to water treatment in a manner similar to many pathogens. Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system ~~minimizes the~~ likelihood that pathogens are present. E.Coli is itself a pathogen, and its detection would be direct evidence of a health risk.

Once a BWA has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Using the most common analytical method, samples must be incubated for ~~a period of~~ 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a BWA. Adding each of these steps together, a normal response period to cancel a BWA under these circumstances would be expected to take at least 3 to 4 days.

A BWA was issued from August 15–20, 2014, for a portion of the City of Flint due to localized detections of total coliform and E.Coli bacteria. Another BWA was issued from September 5-9, 2014, due to localized detections of total coliform bacteria in the same and adjacent portions of the City of Flint. The advisory covered an area approximately 6 square miles. The City of Flint has a total land area just over 34 square miles.

V. TTHM violations

1. What caused the TTHM violations experienced by Flint beginning in late Summer 2014?

TTHMs and HAA5s are the result of organic material in the water reacting with disinfectant used to treat the water. The Flint River has higher levels of organic material than water in the Great Lakes and ~~it was not a surprise that~~ the water produced by the city of Flint developed higher disinfection by-products than the water provided by DWSD. However, because the water treatment plant was previously operating intermittently as an emergency backup supply, it was not possible to predict disinfection byproduct formation until the city began relying on it continuously.

2. How were the violations detected and what was DEQ's response?

In ~~preparation~~ to rely on the Flint River, the city installed ozone to help reduce the organic material (known as precursors), but additional measures were necessary. Because TTHM and HAA5 MCLs are calculated based on a running annual average at a specific location, the city didn't actually violate the safe drinking water act standard until the fall, but because it was apparent in the summer of 2014 that the standard would eventually be exceeded, the city was asked to proactively implement measures to address the problem before the violation required them to do so. The city added granular activated carbon to their filters (after receiving a construction permit from DEQ on date?) and levels of TTHMs and HAA5s were reduced. The city returned to compliance with the running annual average (MCL) on September 1, 2015.

IV. The taste, odor, and smell complaints received by Flint

1. What caused the taste and odor complaints received by Flint from residents?

Taste and odor issues are very personalized. Some water systems receive complaints because of too much disinfectant. In Flint, during the summer after the switch to the Flint River as a water source, taste and odor complaints increased. It was believed at the time to be the result of changes in hydraulic conditions within the distribution system. Water leaving the water treatment plant did not have any unusual odor or color. However, construction in the distribution system, hydrant flushing and changes in flow characteristics are all know causes of disturbances with the distribution system that can cause an increase in taste and odor complaints.

2. What was DEQ's response?

DEQ consulted with the city regarding these complaints. The city indicated that they were offering testing for anyone that had issues and that they were not able to verify the complaints. Jugs of discolored water were being brought to meetings, but city personnel were not able to recreate these situations in the field. In addition, as a result of the repair work that was underway and the increased flushing to reduce water age in the system to help control TTHM's, it was anticipated that there would be short term disturbances in the system that would cause color and odor complaints. All water supplies are advised to provide notice to residents prior to undertaking a flushing program because flushing (even routine flushing) ~~can and will~~ cause temporary problems as described. Based on information from the city personnel, it appeared that the complaints were related to operational activities occurring in the distribution system.

V. The lead issues in the Flint drinking water

1. What causes lead in drinking water?

Lead is rarely found in source water, but enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead pipes, fixtures and solder. The most common problem is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially hot water. Lead can leach into water from pipes, solder, fixtures and faucets (brass), and fittings. The amount of lead in tap water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the pH of the water, and its temperature.

2. What are the lead action levels?

For most contaminants, EPA sets an enforceable regulation called a maximum contaminant level (MCL) based on the MCLG. MCLs are set as close to the MCLGs as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies. However, because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, EPA established a treatment technique rather than an MCL for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to ensure control of a contaminant. The treatment technique regulation for lead (referred to as the Lead and Copper rule) requires water systems to control the corrosivity of the water. The regulation also requires systems to collect tap samples from sites served by the system that are more likely to have plumbing materials containing lead. If more than 10% of tap water samples exceed the lead action level of 15 parts per billion, then water systems are required to take additional actions including:

•Taking further steps optimize their corrosion control treatment (for water systems serving 50,000 people that have not fully optimized their corrosion control) .

•Educating the public about lead in drinking water and actions consumers can take to reduce their exposure to lead.

•Replacing the portions of lead service lines (lines that connect distribution mains to customers) under the water system's control.

3. Are there any safe levels of lead?

The SDWA requires EPA to determine the level of contaminants in drinking water at which no adverse health effects are likely to occur with an adequate margin of safety. These non-enforceable health goals, based solely on possible health risks are called maximum contaminant level goals (MCLG) The MCLG for lead is zero. EPA has set this level based on the best available science which shows there is no safe level of exposure to lead.

4. What is the LCR?

Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. On June 7, 1991, EPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR).

The treatment technique for the rule requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 15 ppb or copper concentrations exceed an action level of 1.3 ppm in more than 10% of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the action level for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control.

5. Did DWSD have a corrosion control plan?

After the LCR ~~was~~ passed, DWSD conducted two rounds of monitoring at for lead and copper. Copper levels were well below action level limits; but lead levels exceeded the action level of 15 parts per billion in many of their customer communities. As a result, DWSD needed to install corrosion control treatment. DWSD performed a corrosion control study and concluded that they could reduce the corrosivity of the water by the addition of an ortho-phosphate.

6. Did DEQ require Flint to have a corrosion control plan in place when it switched to the Flint River as its source of drinking water?

No. The DEQ believed ~~there were two ways~~ under the lead/copper rule to deem a water supply as providing "optimal corrosion control" – either by sampling and determining through a calculation that the supply is "optimal" or by installing treatment. DEQ staff thought it was appropriate to ~~call~~ for the city of Flint to perform two 6-month rounds of monitoring to demonstrate if the city was practicing optimal corrosion control treatment. According to state regulations (R325.604f (2) (iii), a system can demonstrate that it is "practicing optimal corrosion control" by sampling in two, consecutive 6-month monitoring periods and comparing the results of this monitoring to the lead level in the source. Optimal corrosion control under this scenario would be defined as having the 90th percentile in each of these monitoring periods be lower than the sum of the lead in the source and the practical quantification limit for lead of 5 ppb. Since the Flint River has 0 ppb lead, the city would have been deemed optimal if its 90th percentile of lead was 5 ppb or less in these two consecutive periods.

In addition, the city of Flint had been purchasing water from DWSD that was treated for corrosion control. It was DWSD that was considered as having optimized corrosion control at that point. Since the city of Flint had not been the supplier of water before, DEQ did not require the city to "maintain" corrosion control for which it was not responsible. It couldn't "maintain" something that it wasn't doing. As we stated previously, we believed Flint should have been afforded the same opportunity that all other large water systems were

initially granted to demonstrate optimal corrosion control treatment through full scale monitoring. For these reasons, two 6-month rounds of monitoring, as required by the lead/copper rule were felt to be appropriate to determine whether or not optimal corrosion control was being achieved.

7. How does DEQ calculate the 90th percentile?

To determine the 90th percentile of a list of lead or copper results, the following steps are followed:

Step 1: Place lead or copper results in ascending order
Step 2: Assign each sample a number, 1 for lowest value
Step 3: Multiply the total number of samples by 0.9 – this yields the 90th percentile sample. For example: 20 samples x 0.9 = 18th sample. This is the 90th percentile level.

Calculating the 90th percentile is easiest when a supply collects 10 samples (or a multiple of 10). Multiples of 10 require no averaging or interpolation.

8. What was the result of the first round of monitoring conducted by Flint?

The first 6-month round of lead and copper monitoring conducted by the city of Flint ended on December 31, 2014. One hundred samples ~~100 samples~~ were submitted and the 90th percentile lead level was calculated to be 6 parts per billion.

A 90th percentile lead result of 6 ppb is not unusual. Many water supplies in Michigan and across the country have 90th percentile levels of lead greater than this. Even systems that have installed treatment and are considered optimized by definition can and do have levels above 5 ppb.

9. What was the result of the second round of monitoring conducted by Flint?

The second 6-month round of lead and copper monitoring conducted by the city of Flint ended on June 30, 2015. Sixty nine samples were submitted and the 90th percentile lead level was calculated to be 11 parts per billion. The conclusion from these results was that the city exceeded the level required to be deemed as having optimized corrosion control but did not exceed the action level of 15 parts per billion.

10. What actions did DEQ order Flint to undertake after the second round of monitoring?

While the City's LCR compliance monitoring continued to meet action level requirements, the LCR requires all large systems (those serving over 50,000 people) to optimize corrosion control regardless of their 90th percentile lead concentration. Following receipt of Flint's compliance monitoring results, the DEQ required the city to install corrosion control treatment in correspondence dated August 17, 2015.

Under the LCR, the city has 6 months to let the DEQ know whether it intends to conduct a study, 18 months to perform the study, and 24 months to complete installation of corrosion control. The DEQ has requested the city of Flint to accelerate this schedule. The city submitted plans and specifications to install corrosion control treatment and a construction

permit was issued by DEQ on October 28, 2015. The City is in the process of installing the necessary equipment and procuring the appropriate chemicals. Treatment is expected to be on-line by the end of November.

11. What had DHHS advised DEQ regarding blood lead levels prior to DEQ ordering Flint to implement optimized corrosion control?

In an e-mail dated July 28, 2015, DHHS indicated that they "compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –

- Lead testing rates remained about the same from year to year (chart on the right).
- There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).
- However that pattern was not terribly different from what we saw in the previous three years, especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).
- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspect that the summer data spike may be related to this effect.
- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015."

Insert GRAPHS?

This e-mail in concert with the completion of two 6-month rounds of lead compliance sampling data indicating that the City of Flint had not exceeded an action level for lead provided the basis for DEQ to maintain that the water in Flint continued to be in compliance with the SDWA and was safe for consumption.

12. When did DEQ first become aware of allegations of elevated blood levels being detected in certain children?

The DEQ was notified on August 23, 2015 by a professor from Virginia Tech that "over the next few months we will be studying Flint water quality issues..." and similarly notified by U.S. EPA on August 28, 2015. Results indicating elevated lead levels in homes were reported as part of this study in late August.

By this time, the City of Flint had already completed the required two 6-month rounds of monitoring and a determination had been made by the DEQ that the City must install corrosion control treatment in

[Hurley and Edwards all after the fact]

VI. Questions raised regarding DEQ's actions

1. What was DEQ's response to EPA's inquiry in February 2015 regarding the optimized corrosion control treatment being implemented by Flint under the LCR?

DEQ indicated that the city was in compliance with the lead/copper rule. 90th percentile levels were below the Action Level and not unusual. The city was already conducting the second round of monitoring which would provide for a determination of whether or not second round of monitoring which would provide for a determination of whether or not additional treatment needed to be installed. It should be noted that once treatment is designated as optimal, there is no requirement in the lead/copper rule that lead or copper results be lower than they were before treatment was installed. They only need to be lower than the 90th percentile action level in the rule.

2. Did DEQ attempt to mislead EPA in a February 27, 2015 email responding to EPA's inquiry regarding OCCT?

No. There is an e-mail from Steve Busch indicating that the city was practicing corrosion control. This was a misstatement. What was meant was that the city was performing the required monitoring to determine whether or not they were "practicing optimal corrosion control". It was clarified in follow-up telephone conversations with EPA.

3. Has EPA subsequently admitted that the LCR is subject to differing interpretations such as that presented by DEQ?

to all 20 states

On November 3, 2015, U.S. EPA issued a Memorandum regarding the "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems". This memorandum addresses concerns raised about the application of the LCR, specifically the requirements pertaining to maintenance of optimal corrosion control treatment, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. The memo states that this type of situation rarely arises, that the language of the LCR does not specifically discuss such circumstances, and that there are differing possible interpretations of the LCR with respect to how the rule's optimal corrosion control treatment procedures apply to this situation. The memo is intended to clarify prospectively steps agencies should take/apply in the future.

4. Did DEQ reject any of the samples submitted by Flint?

According to the LCR,

Yes, samples at two locations were excluded from the compliance calculation.

Compliance samples must be a first draw, 1 liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted sampling sites, called tier 1 sampling sites. For a municipality such as the City of Flint, the tier 1 sampling pool must consist of single family structures that are:

- served by a lead service line,
- contain lead pipes, or
- contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

Furthermore, if a community has tier 1 sites that contain lead services, they are required to have at least 50% of their compliance samples collected from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters, etc. One of the samples submitted by Flint that was excluded from the 90th percentile compliance calculation in the latest monitoring period was taken from a tap at a non-residential site, and the other sample result that was removed was collected from a single family home that has whole house treatment system (check with Steve). Both of these sites are therefore statutorily excluded from the compliance consideration. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point of use or point of entry treatment can only be used if the community has insufficient tier 1 sites available.

5. **Did DEQ review the information submitted by Flint to ensure all samples were from Tier 1 sites?**

6. **Did DEQ believe the levels of lead found at 212 Browning in April 2015 were indicative of a system-wide problem?**

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The reason for this connection is unknown. The city replaced the lead service line. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem. Subsequent sampling taken at this address showed that replacement of the service line mitigated the problem. There was also no reason to believe that this was indicative of a system-wide problem.

7. **Do DEQ's sampling instructions comply with the LCR?**

8. **Does DEQ require the use of small-neck bottles to obtain samples?**

9. **Why was Flint required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?**

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of the Michigan SDWA.

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

couldn't have been an updated census prior – maybe a census projection?

The number of samples Flint was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census (check with Steve), which listed the city's population as more 100,000 residents. In March of 2015, the city provided an updated census that indicated the city's population had decreased to less than 100,000 (check with Steve). Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

10. Why did DEQ admit it made a mistake?

information

I. The Flint River – is it a safe source of drinking water?

In Michigan, we are fortunate to have high quality drinking water sources. Seventy percent of Michigan's population receives its drinking water from surface water sources, the majority of which is withdrawn from the Great Lakes. A handful of public water supplies in Michigan do treat water from inland rivers, lakes or groundwater under the influence of surface water. All surface water sources and groundwater under the influence of surface water requires significant treatment in order to be safe for consumption. Treatment of surface water is referred to under Act 399 as "complete treatment".

While all surface water sources must receive this higher level of treatment, river sources present a greater challenge than water withdrawn from one of the Great Lakes. River sources are more challenging to treat because of how rapidly water quality may change compared to Great Lakes Sources. Under most circumstances, rivers are also prone to greater fluctuations in temperature, have higher amounts of organic material, greater turbidity (suspended solids), and are more vulnerable to microbiological and viral contamination than Lakes Huron, Erie, Michigan or Superior. It should be noted, that while the water chemistry in the Flint River differs from that in Lake Huron, it can still be treated in accordance with the SDWA and Act 399. Many cities across the country rely on similar sources for drinking water. The waterworks industry has the technology to treat wide ranging source waters to provide potable and palatable drinking water, including direct reuse of wastewater. Regardless of source water quality, all public water systems must comply with the same drinking water standards in the finished water.

Also, it is not the source water that reacts with the homeowners plumbing out in the distribution system, but rather the finished water quality that is important. To begin with, neither the Flint River nor the treated water leaving the City of Flint's water treatment plant contains lead. In addition, the treatment process employed by the City of Flint includes lime softening to reduce the hardness in the river water. Lime softening is not a process that would typically be thought to increase corrosivity of water. The City of Flint, however, does practice recarbonation to readjust pH at the end of the softening process. pH levels of finished water leaving the City of Flint's water treatment plant averaged 7.7. Water monitoring conducted quarterly at 25 sample sites located throughout the distribution system showed the following:

July – September 2014	average pH = 7.71	range: 7.56 – 7.86
October – December 2014	average pH = 7.88	range: 7.62 – 8.10
January – March 2015	average pH = 7.81	range: 7.60 – 7.99
April – June 2015	average pH = 7.63	range: 7.48 – 7.80

The following data was obtained at the same sampling locations throughout the city of Flint's distribution system, but while they were still purchasing water from DWSD before Flint switched to the River as a source:

January – March 2014 (DWSD)	average pH = 7.47	range: 7.40 – 7.54
April 2014 (DWSD)	average pH = 7.49	range: 7.42 – 7.59

Note that the pH numbers while the city was treating the Flint River did not differ significantly from those produced by DWSD, and in fact tended to be slightly higher (less corrosive).

1. **When did DEQ first become aware of allegations of elevated blood levels being detected in certain children?**

The DEQ was notified on August 23, 2015 by a professor from Virginia Tech that "over the next few months we will be studying Flint water quality issues..." and similarly notified by U.S. EPA on August 28, 2015. Results indicating elevated lead levels in homes were reported as part of this study in late August. In early September, information was reported in news articles that pediatricians in the City of Flint had data suggesting an increase in children's blood lead levels in two zip codes in the Flint area.

By this time, the City of Flint had already completed the required two 6-month rounds of monitoring and a determination had been made by the DEQ that the City must install corrosion control treatment as documented in correspondence dated August 17, 2015.

1. **Did DEQ review the information submitted by Flint to ensure all samples were from Tier 1 sites?**

2. **Do DEQ's sampling instructions comply with the LCR?**

We continue to disagree with EPA on sampling protocols. We have attempted to ensure compliance with EPA guidance provided in the preamble to their lead and copper regulations that said that household use should be "typical" for a residential customer on the day before sample collection for lead and copper. Early in the implementation of the LCR, we had encountered too many situations where compliance samples had been collected from kitchen and bathroom taps that had not been used in days and in some cases, even weeks, resulting in excessively stagnated water and correspondingly high lead levels that did not represent typical exposure expected after overnight stagnation. To incorporate these results into further regulatory decision making could have led to actions that were not indicative of a true public health threat. Further complicating this issue was EPA's direct implementation of the LCR in Washington, D.C., where it was learned that some "valid" lead results were not always being included in compliance calculations.

Subsequently, EPA made invalidation of samples for any reason much more difficult. In order to ensure samples were taken at customer taps representative of typical use, we devised our current recommendations for ensuring appropriate but not excessive stagnation for LCR monitoring.

We continue to believe it is appropriate to flush these taps the day before sample collection to simulate and/or ensure typical household use before the tap is allowed to sit overnight to achieve the expected stagnation time the regulation recommends a minimum 6 hours stagnation prior to collecting the first draw sample. The LCR does not say the result should represent the "absolute worst case" condition – it talks about sampling the highest risk locations (lead plumbing, lead service lines, high lead content solder piping, etc.) after overnight stagnation and then collecting a first draw sample so as not to flush elevated lead from that tap at that point in time. Until EPA changes this rule, we are satisfied with our sampling protocol.

3. Does DEQ require the use of small-neck bottles to obtain samples?

No. The DEQ does not mandate the use of small-neck bottles; it is the sampling method that is specified in both the SDWA and Act 399. Each certified drinking water laboratory provides bottles to their customers upon request for any particular analysis. The bottles provided by the DEQ Drinking Water Laboratory for a lead and copper corrosion control sample do happen to have a small cap opening.

4. Why did DEQ admit it made a mistake?

Why did DEQ Admit mistakes and Apologize?

~~Why did the DEQ Apologize?~~

The mounting FOIAs brought to the Director's attention information from within the department that was not previously known to the Director – specifically, that EPA field staff had raised the question of corrosion control in the Spring of 2015 and had been critical of the Department's protocol and testing process. It seemed clear that the EPA field staff had opined that DEQ staff had employed the incorrect protocol. In the face of that new information, the DEQ Executive felt compelled to acknowledge that an error may have been made as part of moving the conversation and the situation forward.

The subsequent acknowledgement by EPA's regional and headquarters leadership that the Lead and Copper rule speaks ambiguously on the issue of continued corrosion control, and that the DEQ did not employ a protocol that was 'wrong,' was of considerable consolation to department staff but only left agency leadership feeling more resolute that the rule needs to be changed, and the Michigan DEQ is interested in being part of that process.

Also, There should not have been any disrespect or discredit for those who Raised ~~the~~ the lead in water issue in Flint. For a time that did not Recognize the Seriousness of the issue, the Director did Apologize.

City of Flint Water
Action Steps for Week of October 26-30

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Conduct After Action Plan	DEQ	George Krisztian	Initial meeting held 10/22/15
2.	Introduce legislative changes to Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone George Krisztian Sonya Butler	Draft language submitted to Maggie Pallone for review
3.	After Action Review Panel	DEQ	Madhu Anderson George Krisztian Karen Tommasulo	Panel created and press release issued on 10/21/15
4.	Staff hiring plan	DEQ	Jim Sygo Maggie Pallone George Krisztian	
5.	Finalize fiscal year 2017 budget request	DEQ	Maggie Pallone George Krisztian	
6.	Meeting(s) with school staff/management	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	A meeting with the 10 remaining schools is tentatively scheduled for the week of 10/26/15
7.	Meet with DHHS and discuss all lead education material for schools	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	DEQ has contacted DHHS to schedule a meeting
8.	Review corrosion control treatment plan and get any EPA comments	DEQ and EPA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Summary of Flint's corrosion control plan submitted to EPA
9.	Review construction permit application and issue construction permit for phosphate equipment	DEQ	Jim Sygo Steve Busch Pat Cook	Additional discussions are in progress with city of Flint

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
			Mike Prysby	
10.	Review Standby Operation of Flint Water Treatment Plant with city of Flint	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Comments by DEQ to city of Flint have been provided
11.	Work with Karegnondi Water Authority (KWA) and other agencies to address bottleneck issues. Check weekly for status update.	DEQ and KWA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Issues regarding soil erosion controls during construction are being addressed
12.	Contact city of Flint for Service Line Record status update and obtain a copy of the records to date	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	
13.	Provide DHHS with any available cross-reference information	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
14.	Develop childcare facility guidance or review DHHS related materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	DEQ has contacted DHHS to schedule a meeting
15.	Create a generic school sampling guidance document for statewide distribution. Target audience: schools served by municipal water.	DEQ and LARA	Jim Sygo Steve Busch Richard Benzie	
16.	Confirm plumbing assessment and sampling is scheduled for Brownell K-2 STEM Academy and Eisenhower Elementary.	DEQ and LARA	Jim Sygo Steve Busch Mike Prysby	

City of Flint Water
Action Steps for Week of November 9-13

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Conduct After Action Plan	DEQ	George Krisztian	Meeting held on 10/29/15 to discuss time line
2.	Introduce legislative changes to Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone George Krisztian Sonya Butler	Draft language submitted to Maggie Pallone for review
3.	Assist After Action Review Panel	DEQ	Madhu Anderson George Krisztian Karen Tommasulo	Panel created and press release issued on 10/21/15
4.	Staff hiring plan	DEQ	Jim Sygo Maggie Pallone George Krisztian	Negotiations underway to contract with the Genesee County Health Department
5.	Finalize fiscal year 2017 budget request	DEQ	Maggie Pallone George Krisztian	
6.	Meeting(s) with school staff/management	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	A summary report for Freeman Elementary School has been drafted
7.	Follow up with city of Flint regarding corrosion control treatment and their plans to address requirements and options provided for in 10/30/15 DEQ letter	DEQ and EPA	Jim Sygo Steve Busch Pat Cook Mike Prysby	

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
8.	Follow-up with city of Flint regarding installation of corrosion control	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	E-mailed city of Flint on 11/4/15; 11/5/15 response indicated equipment to be ordered and plan to start installing feed piping on 11/9/15
9.	Review Monthly Operation Reports (MORs) for Standby Operation of Flint Water Treatment Plant with city of Flint; draft letter to city of Flint documenting Standby Operation requirements	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Letter is drafted and will be sent to city of Flint the week of 11/9/15; MOR review with city of Flint will be conducted during next routine site visit
10.	Work with Karegnondi Water Authority (KWA) and other agencies to address bottleneck issues; check weekly for status update	DEQ and KWA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Issues regarding soil erosion controls during construction are being addressed
11.	Continue evaluating city of Flint Service Line Record status and comparison to sampling pool	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Letter requesting additional information/documentation to be provided to city of Flint on 11/9/15
12.	Provide DHHS with any available cross-reference information regarding lead service lines and plumbing materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
13.	Develop draft sampling protocol for residential exposure assessment for DHHS	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	Draft document under development; discussed preliminary plan with DHHS

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
14.	Make progress on drafting a generic school sampling guidance document for statewide distribution; target audience: schools served by municipal water	DEQ and LARA	Jim Sygo Steve Busch Richard Benzie	Draft document under development to make it an easy-to-read and follow guidance document
15.	Attend Technical Advisory Committee meeting on November 9, 2015	DEQ	Jim Sygo Mike Prysby	
16.	Draft Summary Reports for Brownell Elementary and Eisenhower Elementary	DEQ and LARA	George Krisztian Steve Busch	
17.	Conduct Plumbing Assessments at Durant-Tuuri-Mott Elementary and Central Kitchen	DEQ and LARA	George Krisztian Steve Busch	
18.	Conduct Sampling at Durant-Tuuri-Mott Elementary and Central Kitchen	DEQ and LARA	Jim Sygo George Krisztian Mike Prysby	
19.	Evaluate Lab Analysis and Perform Data Compilation for Doyle Ryder Elementary and Pierce Elementary	DEQ	George Krisztian Steve Busch Mike Prysby	

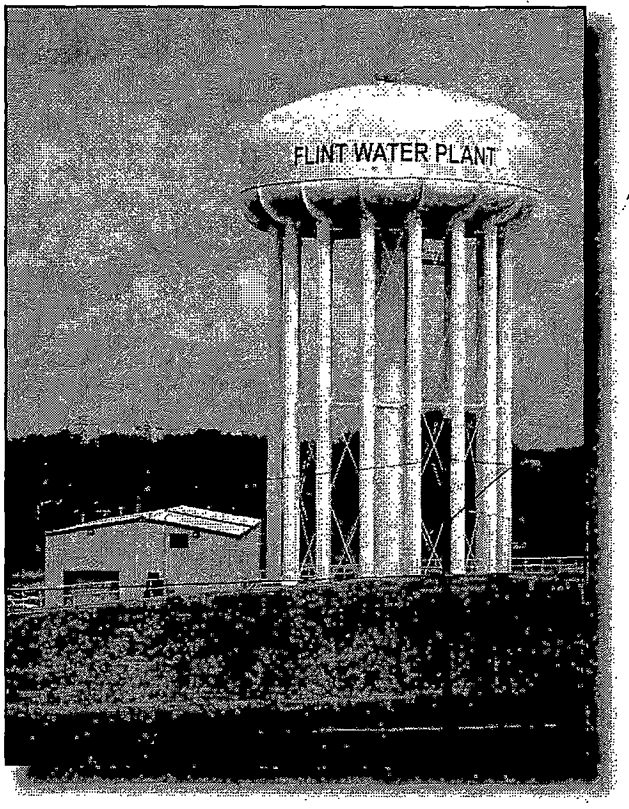
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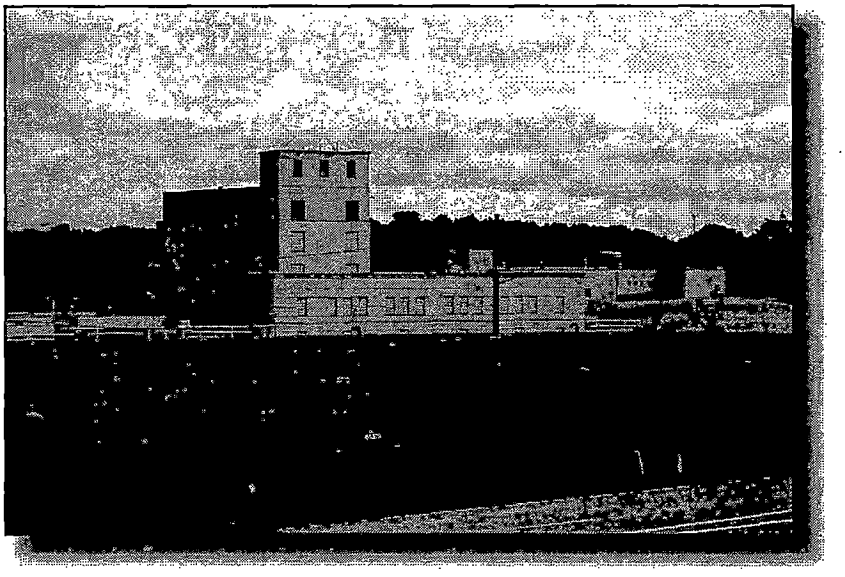
Analysis of the Flint River as a Permanent Water Supply for the City of Flint

Prepared for:

City of Flint

1101 S. Saginaw Street
Flint, MI 48502
(810) 766-7346





ROWE

LAN

Wurfel, Brad (DEQ)

From: Wurfel, Brad (DEQ)
Sent: Friday, March 13, 2015 6:51 PM
To: 'Wurfel, Sara (GOV) (WurfelS@michigan.gov)'
Subject: FW: Info download per our conversation
Attachments: Launch_and_Retrieval_Methods.pdf; OTsp07_TB.pdf; PotableWaterSeweragePipeLines.pdf; PPP_General_Brochure.pdf; USG Advanced Pipe Cleaning (Ice Pigging).pdf; 0707_036.pdf; 150207_155445_COLLAGE-1.jpg

Importance: High

FYI
b

From: Wurfel, Brad (DEQ)
Sent: Friday, March 13, 2015 6:10 PM
To: Hollins, Harvey (GOV)
Cc: 'Wyant, Dan (WyantD@michigan.gov)'
Subject: Info download per our conversation
Importance: High

Harvey,
We've got two issues I wanted to update you on. After trying to do this all in a single email, I realized it gets messy. So this is the first of two.

The water quality question remains under consideration. I've had a couple meetings this week with our drinking water team. I will circle back and push them for a specific recommendation on a good retail filter. Thus far, they've presented a range of options and been uncomfortable going past that because a) we don't specialize in home filtration. We're in charge of commercial / municipal size systems. And b) most filtration systems remove contaminants and toxics and organics. There's no way to know for sure if a faucet model will effectively work on odor or color issues until someone installs it and tries it out. For that, we'd need a home that has reported discolored / smelly water. And for that, I'd imagine we'd need to connect with the city and see if they've got logs of residents who have made these complaints.

The other potential help that could come from the state – and after conversations with our folks I maintain it might be the best help we can give them – has to do with maintenance. Of the $2 million announced in January from Treasury, $900,000 was earmarked for developing a maintenance triage plan. As that comes together, the next step will be actual maintenance. This means replacing valves and rotten sections of pipe, but it also means "pigging" lines with an inline device that runs through water transmission lines and forces out any built-up… material. In coordination with bleeding stagnant water via hydrants, this would probably be the fastest, most effective way to address the discolored / odorific water.

Our department specialists working with Flint imparted in an internal meeting this morning that the city has been a little reticent to pig their lines because the system is in such a condition that they worry a valve opened won't close (and vice versa), and a line that is barely still functional might get blown by the pigging. Our position is that would be preferable – maintenance, after all, is about addressing those very situations. But if funding can be identified, through SOM or some foundation benefactor,

and we can convince the city to tackle the work, this would be a great way to spend it. The PDF files enclosed offer some more information about what this is, how it works, etc.

I'm still working to get a report of all the local municipal violations over the past two years. The two staff in the drinking water division who run those database searches are out of state this week, in Florida and Alaska respectively. Division assures me they'll get that report run as a priority upon return of those folks next week. In the meantime, here are some images (the Jpeg titled COLLAGE). It shows various conditions, mostly at mobile home parks around the state, where the water system has failed. May or may not be of use, but if nothing else it exemplifies that this stuff happens, much as we try to make sure it does not.

This is email one of two. The other issue I will present in the next email. If it is at all possible, I'd suggest we need to assemble Treasury, MDCH, DEQ and Ambrose + RS team sometime Monday to get everyone briefed on what each agency is doing in Flint right now and what we may need to do next. Don't know if that meeting gets called by you or Dennis, but I think you and I agree that we need a united, coordinated team approach to develop quickly.

Thanks,
b

Brad Wurfel
Communications Director
Michigan Department of Environmental Quality
517-284-6713
PPI cell

Office of Mayor Karen W. Weaver, Ph.D.
City of Flint, Michigan, County of Genesee

Declaration of State of Emergency

Authority Emergency Management Act: Michigan Emergency Management Act 390 of 1976

BY THE MAYOR:

Whereas; in accordance with the Michigan Emergency Management Act, I am declaring a State of Emergency for the incorporated boundaries of the City of Flint, Michigan; and

Whereas; the City of Flint has experienced a Manmade disaster by switching to the use of the Flint River before connecting to KWA; and

Whereas; the City of Flint children have experienced increased blood lead levels since the switch to the Flint River; and

Whereas; this damage to children is irreversible and can cause effects to a child's IQ, which will result in learning disabilities and the need for special education and mental health services and an increase in the juvenile justice system; and

Whereas; this will increase the need for foster and adoptive parents as a result of social services needed due to the detrimental effects of the high blood lead levels; and

Whereas; I am requesting that all things be done necessary to address this State of Emergency Declaration, effective immediately; and

Whereas; this action is being taken to protect the health, safety, and welfare of the citizens of Flint; and

Whereas; I request that the Genesee County Board of Commissioners call a Special Meeting no later than the end of December 2015 to take action supporting this State of Emergency; and

Now, Therefore, I, Mayor Karen W. Weaver declare a State of Emergency in the City of Flint, effective, December 14, 2015;

Karen W. Weaver

Dr. Karen W. Weaver, Mayor

City of Flint Water
Action Steps for Week of November 2 - 6

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Conduct After Action Plan	DEQ	George Krisztian	
2.	Introduce legislative changes to Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone George Krisztian Sonya Butler	
3.	Assist After Action Review Panel	DEQ	Madhu Anderson George Krisztian Karen Tommasulo	
4.	Staff hiring plan	DEQ	Jim Sygo Maggie Pallone George Krisztian	
5.	Finalize fiscal year 2017 budget request	DEQ	Maggie Pallone George Krisztian	
6.	Meeting(s) with school staff/management	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	
7.	Contact DHHS regarding lead education material for schools. Provide information as requested by DHHS.	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
8.	Follow up with City regarding corrosion control treatment and their plans to address requirements and options provided for in DEQ letter.	DEQ and EPA	Jim Sygo Steve Busch Pat Cook Mike Prysby	
9.	E-mail City regarding timing to install corrosion control now that the construction permit has been issued.	DEQ	Jim Sygo Steve Busch Pat Cook	

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
			Mike Prysby	
10.	Review MOR for Standby Operation of Flint Water Treatment Plant with city of Flint. Draft letter to City documenting Standby Operation Requriements.	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	
11.	Work with Karegnondi Water Authority (KWA) and other agencies to address bottleneck issues. Check weekly for status update.	DEQ and KWA	Jim Sygo Steve Busch Pat Cook Mike Prysby	
12.	Continue evaluating city of Flint Service Line Record status and comparison to sampling pool.	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	
13.	Provide DHHS with any available cross-reference information regarding lead service lines and plumbing materials.	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
14.	Develop childcare facility guidance or review DHHS related materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
15.	Develop draft sampling protocol for residential exposure assessment for DHHS.	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
16.	Make progress on drafting a generic school sampling guidance document for statewide distribution. Target audience: schools served by municipal water.	DEQ and LARA	Jim Sygo Steve Busch Richard Benzie	

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
17.	Attend meeting arranged by DHHS regarding Residential EBL Investigations and Water Testing	DEQ and DHHS	Jim Sygo Steve Busch Mike Prysby	

civil + env. engr.

Lutgarde Raskin

Stuart Batterman - public health

Krista Wigginton.

Jimmy
Emily
Nicole

field sampling w/ AA:
work w/ undergrads (journey a drug + microbial water quality.

following new media re: flint
media - Pb report -
should we offer to help do more analysis?
can we help students w/ data analysis?
- assessment of problem?
- monitor before and after?

Wurfel, Brad (DEQ)

From: Wurfel, Brad (DEQ)
Sent: Friday, March 13, 2015 6:49 PM
To: Hollins, Harvey (GOV)
Cc: 'Wyant, Dan (WyantD@michigan.gov)'
Subject: Part II
Attachments: FOIA Request Flint Water.doc

Importance: High

This is the second issue I mentioned earlier today.
In December, our staff became peripherally aware that the hospitals in Genesee were seeing an uptick in Legionnaires cases.

Legionnaires is a water-borne illness. It essentially is a type of pneumonia caused by a bacteria. It is treated with antibiotics. Untreated, it can be deadly. It most often manifests in nursing homes and assisted living facilities, because the transmission is through water vapor getting into lungs – via air conditioners, vaporizers or low-flow shower heads that produce a lot of misting. You can drink water with this bacteria in it and not get sick – it has to enter the lungs in vapor.

I don't have any details on the cases, but here is what I understand to this point:

- More than 40 cases reported since last April. That's a significant uptick – more than all the cases in the last five years or more combined.
- April / May is usually the start of Legionnaires season – it proliferates in warmer months – but April also is the point at which the city switched to the Flint River as a source.
- County Health Departments are supposed to perform epidemiological tracebacks on all confirmed cases of this disease, to locate the source and address it. Genesee County Health had not done this work as of November. At a January meeting with area hospitals, MDCH, DEQ and others, Nick Lyon reportedly directed the county health folks, in terms not uncertain, to get this done as a priority. As I'm sitting here today, it still is not done to my knowledge.
- My counterparts at MDCH informed me today that they cannot step in unless they are invited or unless the outbreak is multi-county. They've not been invited until, I believe, today. That may be in part because of the email string and letter I've enclosed here, which was unknown to MDCH until I shared it over to them.

The email thread below is best read bottom-to-top, and read prior to reading the enclosed FOIA to the city.

Essentially, Jim Henry with Genesee County Health is putting up the flare. He's made the leap formally in his email that the uptick in cases is directly attributable to the river as a drinking water source – this is beyond irresponsible, given that is his department that has failed to do the necessary traceback work to provide any conclusive evidence of where the outbreak is sourced, and it also flies in the face of the very thing a drinking water system is designed to do.

DEQ did not receive this FOIA, which appears designed to buttress his position in the email -- that sections of the water delivery system may be harboring this bacteria. We think it would be highly unlikely that anything would be found around the plant, where the water is treated. Most often, this bacteria forms at the building / residential point in the system. Legionnaires is NOT among the 90 water contaminants screened in the Safe Drinking Water Act, but in the absence of action by county health, our staff are now considering taking samples from various points in the system and working with DCH's lab to test for it, if for no other reason than to rule it out.

Regardless, the accusation is serious and the nature of the communication leaves me thinking we would be advantaged to bring together all the agencies asap to share what information we have and develop a response / screening strategy before the weather gets warm again.

I realize these are long emails. Thanks for your patience.
b

Brad Wurfel
Communications Director
Michigan Department of Environmental Quality
517-284-6713
PPI cell

From: Shekter Smith, Liane (DEQ)
Sent: Thursday, March 12, 2015 8:41 AM
To: Wurfel, Brad (DEQ); Sygo, Jim (DEQ); Howes, Sarah (DEQ)
Cc: Shaler, Karen (DEQ); Benzie, Richard (DEQ); Devereaux, Tracy Jo (DEQ); Busch, Stephen (DEQ)
Subject: FW: Information Request and Documentation
Importance: High

The district received this late Tuesday.

Steve Busch has indicated that the district has not received a meeting request from Jim Henry or the Genesee County Health Department as indicated in his email below.

The FOIA is specifically directed to the City of Flint not the DEQ.

While the change in source may have created water quality conditions that could provide additional organic nutrient source to support legionella growth, there is no evidence or confirmation of legionella coming directly from the Water Treatment Plant or in the community water supply distribution system at this time.

Seems like the next step is to communicate with DCH and possibly develop a joint strategy/response. Not sure who in Exec wants to take the lead on this. Steve Busch and Mike Prysby will continue to be lead for us on this. They have been in contact with DCH recently but only to learn that little progress has been made in identifying a source or sources for the illnesses.

EMAIL FROM DEQ TO HENRY SENT THIS AFTERNOON:

Mr. Henry,

The January 27, 2015, FOIA request you provided was directed to the City of Flint, not the DEQ. The DEQ has no record of a FOIA request from your office for such information. It is our understanding that the City has responded to your FOIA request, has helped you adequately redefine your request within the City's scope of public record to address such ambiguities as "any additional areas of concern", and provided you with additional information beyond the scope of your request.

The DEQ fully recognizes the public health threat posed to individuals that contract Legionnaires' Disease with the understanding that the disease is not contracted by ingestion of potable water and therefore not regulated under the federal Safe Drinking Water Act. Your email below claims that you have explicitly explained the situation to our Department. However, since contacting our office early last October to indicate a rise in cases, we have not received any further information regarding your epidemiological investigation into this matter.

Further, conclusions that legionella is coming from the public water system without the presentation of any substantiating evidence from your epidemiologic investigation appears premature and prejudice toward that end.

It is highly unlikely that legionella would be present in treated water coming from the City of Flint water treatment plant given the treatment plant's use of ozone along with complete treatment and chlorine disinfect contact time to comply with federal surface water treatment rules for potable water. Detections of total coliform or heterotrophic bacteria in the City's public water distribution system indicate an environment where bacterial growth may be supported. However, there is no direct correlation that can be made to the presence of legionella. While total organic carbon levels in potable water may serve as a food source for bacteria growth in private plumbing system, water temperatures in the City's distribution system are below legionella growth range, and chlorine residual levels would also limit such growth.

Our office agrees that water main breaks, water leaks, and system repairs are possible vectors for legionella to enter the public water system. These should be investigated as part of your epidemiology. DEQ staff can be made available to assist GCHD and the City regarding such matters, but to date no request by GCHD for any such meeting has been received, let alone declined as alleged in your email.

If GCHD is seeking assistance to complete its epidemiological investigation regarding this matter, such resource requests should be directed to the Michigan Department of Community Health. Our Office agrees that a multi-agency partnership would be beneficial to move forward and develop a unified response. In that respect, if our Office can be of any further assistance you may contact me directly.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

From: "Henry, James" <jhenry@gchd.us>
Date: March 10, 2015 at 6:40:17 PM EDT
To: Howard Croft <hcroft@cityofflint.com>, "Mike Prysby (DEQ)" <prysbym@michigan.gov>, Elizabeth Murphy <emurphy@cityofflint.com>, "Natasha Henderson" <nhenderson@cityofflint.com>, Jerry Ambrose <jambrose49@gmail.com>, Dayne Walling <dwalling@cityofflint.com>
Cc: "Valacak, Mark" <MVALACAK@gchd.us>, "Cupal, Suzanne" <scupal@gchd.us>, "Hasan, Shurooq" <shasan@gchd.us>, "Childs, Bonnie" <BCHILDS@gchd.us>, "Hallwood, Dawn" <dhallwood@gchd.us>, "Johnson, M.D., Gary" <GJOHNSON@gchd.us>
Subject: Information Request and Documentation

Hello everyone,

The Genesee County Health Department has made several written and verbal requests for specific information since October, 2014, including a Freedom of Information Act Request on January 27, 2015. The information still has not been received and the city's lack of cooperation continues to prevent my office from performing our responsibilities.

The Genesee County Health Department has the responsibility to conduct illness investigations and consider all potential sources; this is not optional. In 2014, Genesee County experienced a significant increase of confirmed Legionella illnesses relative to previous years. Legionella can be a deadly, waterborne disease that typically affects the respiratory system.

The increase of the illnesses closely corresponds with the timeframe of the switch to Flint River water. The majority of the cases reside or have an association with the city. Also, McLaren Hospital identified and mitigated Legionella in their water system. This is rather glaring information and it needs to be looked into now, prior to the warmer summer months when Legionella is at its peak and we are potentially faced with a crisis.

This situation has been explicitly explained to MDEQ and many of the city's officials. I want to make sure, in writing that there are no misunderstandings regarding this significant and urgent public health issue. The Trihalomethane issues "pale in comparison" to the potential public health risks of Legionella.

I am submitting the attached FOIA request again and requesting that the legal obligations of the request are met. If the information is not available, please let me know. In the past, I have requested to meet with the water plant staff and MDEQ regarding Legionella concerns. I did not receive a response from the water plant staff and MDEQ declined. I think it is in the best interest for all stakeholders that we meet and discuss the issues.

Respectfully,

Jim

Jim Henry
Jim Henry BS, MBA
Environmental Health Supervisor
Genesee County Health Department www.gchd.us
630 S. Saginaw St., Suite 4
Flint, MI 48502-1540
Phone (810) 257-3618 Fax (810) 257-3125
E-mail jhenry@gchd.us

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

April 29, 2014

Mr. Daugherty Johnson, Utilities Administrator
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502

WSSN: 02310

Dear: Mr. Johnson

Subject: Act 399 Capacity and Reliability Requirements

This letter, per your request, is being written as verification that the City of Flint water system is currently in compliance with required capacity and power service reliability requirements under the Michigan Safe Drinking Water Act and Administrative Rules, Supplying Water to the Public.

The required capacity of a waterworks system as established in Rule 1204 (R 325.11204) required sufficient capacity to meet approved finished water supply requirements, and is based upon the combination of the following options:

a. Rated capacity of an approved surface water supply or complete treatment system;
b. Firm capacity of approved groundwater supply;
c. Available contracted capacity that can be delivered from another public water supply;
d. Excess finished water storage capacity.

Under the first option listed above, the City's baseline water withdrawal capacity from the Flint River, and rated capacity of the City's water treatment plant (WTP), both exceed its finished water supply requirements. The rated capacity of a complete treatment system is established under Rule 1006 (R 325.11006). In accordance with this rule, the Department of Environmental Quality (DEQ) has established a rated capacity of 36 million gallons per day for the City's WTP, which again far exceeds current and future finished water supply requirements for the City's service area.

In addition, while capacity under item d above for excess finished water storage has not been established, the City currently has enough finished water storage to supply more than 2 days of normal finished water supply requirements

Rule 1206 (R 325.11206) requires water systems to provide a means to continuously supply fully finished water during normal power service interruption. The City's WTP is now equipped with a redundant electrical system that includes provisions for stand-by power generation; thus meeting this requirement.

While additional means to meet the above requirements for capacity and power interruption can be provided through contracted interconnections with other water systems, the City has demonstrated compliance with these requirements without such means. However, the DEQ still supports and encourages such interconnections be maintained for emergency purposes as an additional barrier to help maintain public health protections. While these emergency

interconnections have no requirement to establish an available or contracted capacity, the DEQ encourages the corresponding utilities to establish mutual aid agreements where possible. Such agreements can be developed through the Michigan Water/Wastewater Agency Response Network (MiWARN). For more information, please visit miwarn.org. A MiWARN brochure is also enclosed for your information.

If you have any questions, feel free to contact me at (517) 290-8817; prysbym@michigan.gov; or Department of Environmental Quality, Office of Drinking Water and Municipal Assistance, Lansing District Office, 525 West Allegan Street, 1st Floor South, P.O. Box 30242, Lansing, Michigan 48909-7742.

Sincerely,

Michael F. Prysby, P.E.
District Engineer
Field Operations Section
Office of Drinking Water and
Municipal Assistance

mfp/jlr
Enclosure

cc: Mr. Howard Kroft, Utilities Director, City of Flint

STATE OF MICHIGAN
EXECUTIVE OFFICE
LANSING

RICK SNYDER
GOVERNOR

BRIAN CALLEY
LT. GOVERNOR

PROCLAMATION

DECLARATION OF EMERGENCY

WHEREAS, Section 1 of Article V of the Michigan Constitution of 1963 vests the executive power of the state of Michigan in the Governor; and

WHEREAS, under the Emergency Management Act, Act No. 390 of the Public Acts of 1976, as amended, MCL 30.401 to 30.421, the Governor is responsible for coping with dangers to this state or the people of this state presented by a disaster or emergency or threat thereof, and may issue executive orders and proclamations, having the force and effect of law to implement the Act; and

WHEREAS, under Section 3 of the Emergency Management Act, 1976 Public Act 390, MCL 30.403, the Governor shall, by executive order or proclamation, declare a state of emergency if the Governor finds that an emergency has occurred or that the threat of an emergency exists; and

WHEREAS, on April 25, 2014 the City of Flint, Michigan switched from the Detroit water system to the Flint River as a water source, the harmful effects of untreated water struck the city's water infrastructure, causing leaching of lead into the water which caused damage to the water system and potential negative health impacts to the citizens; and

WHEREAS, the area affected includes parts of the City of Flint, within the County of Genesee; and

WHEREAS, the damaged water infrastructure and leaching of lead into the city's water caused damage to public and private water infrastructure, and has either caused or threatened to cause elevated blood lead levels, especially in the population of children and pregnant women, and causing a potential immediate threat to public health and safety and disrupting vital community services; and

WHEREAS, from October 1, 2015 to this date, the County of Genesee and the City of Flint have taken a number of actions to cope with the situation, including but not limited to, switching back to the Detroit water system on October 16th, declaring local states of emergency, activating the emergency response and recovery aspects of their emergency operations plan, marshaling

and distributing required resources on a city-wide level, and issuing emergency public information and bulletins; and

WHEREAS, local resources have been insufficient to address the situation, and additional assistance from voluntary organizations and the state is required to protect public health, safety, and property, and to lessen or avert the threat of more severe and long lasting impacts to the community;

NOW, THEREFORE, I, RICHARD D. SNYDER, Governor of the state of Michigan, pursuant to the Constitution of the state of Michigan and provisions of Act No. 390 of the Public Acts of 1976, as amended, do hereby proclaim that a state of emergency exists in the aforementioned county and municipality; and

FURTHER, the Emergency Management and Homeland Security Division of the Department of State Police shall coordinate and maximize all state efforts, and may call upon all state departments to utilize resources at their avail to assist in the emergency area pursuant to the Michigan Emergency Management Plan; and

FURTHER, termination of this emergency will occur at such time as the threats to public health, safety, and property caused by the emergency no longer exist and appropriate programs have been implemented to recover from the effects of this emergency, but in no case longer than February 1, 2016, unless extended as provided by Act No. 390.

Given under my hand and the
Great Seal of the State of Michigan this
5th day of January in the Year of Our
Lord, Two Thousand and Sixteen.

RICHARD D. SNYDER
GOVERNOR

BY THE GOVERNOR:

SECRETARY OF STATE

FILED WITH SECRETARY OF STATE
ON 1/5/16 AT 4:00pm

City of Flint
Technical Advisory Committee - Weekly Report

October 28th, 2015

Last meeting: 10-7-2015
Next meeting: 11-18-2015, 2:00 pm

I. Overview –

Please note that we have set the date for the next meeting at **Wednesday November 18th** 2:00 pm at Flint City Hall (there will be a call in number). The previous date proposed is Veterans Day and there were several conflicts.

II. New Items this week

Technical Advisory Committee Addition

I have added Professor Shawn McElmurry, An Associate Professor at Wayne State University in the Dept. of Civil and Environmental Engineering to the TAC team. Professor McElmurry contacted me a few weeks ago and visited the Water Plant and took several samples from the Flint River and the distribution system.

Professor McElmurry's team has submitted a proposal to the National Institute of Environmental Health Sciences (NIEHS) for funding to evaluate how changes in the drinking water system are impacting water quality. Their project has the following goals:

- Define exposure within Flint's drinking water system using a combined sampling and modeling approach.
- Quantify how the concentrations of DBPs and Pb change over time within the water distribution system.
- Apply a high-throughput bioassay to evaluate toxicity of complex chemical mixtures (focused on DBPs).
- Communicate results to water utility operators, government officials (city, state, and federal), public health agencies and residents using principles of risk communication through a variety of channels including social media.

Given their goals and their proximity to Flint, I believe that adding Professor McElmurry to the Technical Advisory Team will bring added evaluation and data to our cause.

III. Ongoing Items of concern or in process

A. Detroit Water

Water from Detroit is now flowing through all of the transition mains and should be present at most taps throughout the City. We are flushing hydrants in a manner to help circulate water within the system, individual usage patterns will dictate water being at every household and business. We will be testing hardness and phosphate levels over the next several days across the city to verify the presence of Detroit water.

B. Service Lines

I want to clarify where we are regarding the service line data. The 45,000+ cards are only one aspect of the information and represent the original data. As work has occurred over the last several decades, the Service Center has built a second, partial set of cards with updated information. Both sets of cards are kept as permanent records with accurate data. We also have maps which were last updated in 1984 with additional information. Finishing what the City started has involved stitching together three sets of data and then putting that into a database.

U of M Flint has taken ownership of the project and they have measured how much labor it will take to complete the task. Professor Kaufman is working pro bono but has just submitted a proposal to the City for the labor required in order to complete the task. The proposal will be turned around ASAP for them to complete the work.

C. Corrosion Control

On October 19th 2015 our engineering consultant submitted a design package to the DEQ with recommended phosphate dosing. After EPA review, the comments were just returned and today LAN is discussing with DEQ when to expect final approval and permitting. There are questions regarding the elevated dose of phosphate that we will bring to the next Technical Advisory meeting for discussion. The questions will are largely around the pros and cons of the specified dose level and the public communication and expectations that should accompany the implementation.

Issue	Description	Action Item	Owner
Corrosion Control	To help recoat the piping	The final design has been sent to MDEQ for peritting.	LAN
Surge Protection	Main breaks are down.	Leak detection will continue for the next few months.	City Staff
KWA - Prep	Design and installation of final improvements needed	Internal November 5th meeting scheduled to discuss specifics. See item IV.	LAN/City
KWA - Transfer Station	Buffer for water supply from KWA	Internal November 5th meeting scheduled to discuss specifics. See item IV.	LAN
Hydraulic Model	Filling with data	Need to verify broken valve locations for model to be accurate.	LAN/City
SCADA Upgrades	Used to develop automation within the system.	First phase went in in FY15 second and final phase due to be installed prioir to KWA's arrival.	City Staff

IV. Needs for treating and using water from KWA

The City is meeting with the engineering consultants on Thursday November 5th in order to build a project timeline of all items needed to be prepared for water delivery from KWA. The following items will be discussed:

A. Design and construction of transfer station to Dort Reservoir (while in use).
   - Needed to buffer the volume of water that KWA is capable of delivering prior to their reservoir tank being activated.

B. KWA access to the plant.
   - The current design calls for use of the pipe that was empty and is now in use. An alternate plan needs to be discussed and vetted.

C. Alum feed system
   - Needed for coagulant change to raw water and to reduce chloride.

V. Testing Data

We will continue to update this data table weekly, if there is something that is missing or additional data that is requested please let me know and we will attempt to add it to the table.

Date	Flow (MGD)	pH (S.U.)	Total Hardness (mg/L)	Total Alkalinity (mg/L)	Non-carbonate Hardness (mg/L)	Chloride (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Total Phosphate (mg/L)
Range GLWA	12 - 19	7.3 - 7.6	98 - 102	70 - 76	26 - 32	11 - 13	26 - 32	3.9 - 6.3	1.0 - 1.2
10/26/2015	12	7.36	102	74	28	11	30.5	6.3	1.14

Flint Drinking Water Action Plan Update

FOIA EXEMPT AND ATTORNEY-CLIENT PRIVILEGE

- The initial After Action Plan meeting was held on October 22. Topics covered were:
  - The discussion of the roles of each team member
  - The scope of the After Action Plan
  - The time frame in which the After Action Plan is to be completed

  The main components of the After Action Plan are:
  - An After Action Review Summary time line that details critical events in chronological order, asking key questions, and providing explanations for actions taken
  - Implementation of the Governor's 10-point Action Plan
  - An evaluation of if DEQ made mistakes and, if so, what they were
  - An evaluation of lessons learned, defining what we can do better/differently in the future

- Participated on an October 22 conference call with the EPA's Flint Safe Drinking Water Task Force to discuss proposed sampling protocol and the comments received from EPA. Agreed to reconvene a call next week to discuss how the pilot sampling effort goes, what went well, what might need to be adjusted, etc.

- A summary of our discussion with EPA regarding Flint's corrosion control plan was provided to Darren Lytle and Michael Schock of EPA. The summary included confirmation of the actual phosphate dosage from the Detroit Lake Huron Water Treatment Plant.

- Proper dosages are now confirmed, based on incoming phosphate residual at Flint. A product cut-sheet to confirm NSF approval and maximum dose is to be provided shortly. Flint's consultant (Lockwood, Andrews & Newnam, Inc.) will also confirm proper sizing of the feed pumps. Anticipate receiving this information on October 23, which will facilitate issuance of the Act 399 permit.

- An updated monitoring schedule is completed and signed. The schedule will be mailed to the city of Flint on October 23. A copy of the updated monitoring schedule is attached.

- An e-mail was sent to John O'Brien of Genesee County informing him of our concern over improper soil erosion control measures at the pipeline job site and what corrective measures were being taken to avoid a potential halt of construction by the Lapeer County Road Commission. Genesee County has not responded thus far.

Additional Actions:

- A conference call was held among representatives from DEQ/DLARA/DHHS to further discuss ways to ensure that the efforts of all three agencies were coordinated. It was determined that weekly calls providing updates to the group as a whole would be beneficial. DEQ also agreed to copy DLARA and DHHS on their daily update report to the Governor's office.

- Flint Action Plan Coordinator George Krisztian contacted Flint Community Schools Superintendent Bilal Tawwab to obtain permission to allow the *Detroit Free Press* to take footage of the water sampling process to be conducted at Freeman Elementary School on Saturday, October 24. Superintendent Tawwab gave his permission, stating that it would not be an issue since there would not be any students present.

- DLARA completed additional review of documents at the Flint repository to assist with the sequencing at the schools.

- Flint is able to provide DLARA plumbing inspectors with on-site workspace; additional documentation gives greater guidance on locations for plumbing fixtures.

- DLARA received confirmation from DEQ that bottles and necessary equipment will be available for sampling start on Saturday, October 24.

Attachment (Updated Monitoring Schedule)

Prepared by: George Krisztian, Flint Action Plan Coordinator
Laboratory Director
Department of Environmental Quality
Telephone: 517-284-6719
Cell: 517-420-5897 (new number)
October 23, 2015

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

October 22, 2015

Mr. Brent Wright
City Of Flint – D.P.W
Flint Water Plant
4500 North Dort Highway
Flint, Michigan 48505

WSSN: 02310

Dear Mr. Wright:

SUBJECT: Revised Drinking Water Monitoring Schedule – 2015
Monthly Operation Reports
Siting Plans and Record Keeping

Monitoring Schedule:

Enclosed is your revised Drinking Water Monitoring Schedule for remainder of calendar year 2015 outlining the minimum requirements for your public water supply. Your schedule has been revised based on the City's change in source of its drinking water from the treatment of the Flint River utilizing the City's Water Treatment Plant to the Great Lakes Water Authority/Detroit Water and Sewerage Department. Collect samples early in the monitoring period of the year indicated on the schedule. If you use a private laboratory you are required to report the results to us within the first ten days of the month following the month that you received the results. To receive credit for monitoring, the **"WSSN"** (water supply serial number), the **"Site Code,"** and **"County"** must appear on the sample result. Bottles will NOT be mailed automatically. If you use the Department of Environmental Quality Laboratory, you can order bottles by calling 517-335-8184. Be certain of the United States Environmental Protection Agency sampling and analysis method requirements for hold times.

Monthly Operation Report (MOR) Requirements:

The City shall submit MORs as required under Administrative Rule 1502 (R325.11502). Please note required coliform bacteria monitoring results and associated chlorine residual monitoring shall be submitted to the department within the first 10 days following the end of the required monthly monitoring period. In addition, monthly operation reports shall be submitted to the department during the month following the month for which the monthly operation report was prepared.

Disinfection By-Product Sample Siting Plans:

The City of Flint shall continue routine standard monitoring of disinfection by-products, according to your Disinfection & Disinfectants By-Product (DDBP) plan which identifies 8 sites for routine quarterly monitoring.

Lead and Copper Monitoring Requirements and Site Sample Pool

Please note distribution system monitoring for water quality parameters (WQPs) continues at the expanded set of 25 sites per quarter. Lead and copper monitoring in accordance with the requirements of Administrative Rule 710a (R325.10710a) is being required for the 6 month period between January 1, 2016 and June 30, 2016. The City must ensure its sample site pool is large enough to collect the number of lead and copper tap samples required. All sites from which first draw samples are collected shall be selected from the pool of targeted sampling sites.

The City shall also conduct additional operational monitoring to demonstrate the effectiveness of corrosion control treatment.

Record Keeping:

The City shall maintain all monitoring records in accordance with all applicable requirements under the Administrative Rules including Rule 720a (R325.10720a), Rule 1506 (R325.11506), and Rule 1507 (R325.11507).

The Michigan Safe Drinking Water Act requires certain reports to be submitted to this office each year. Please remember that cross connection reports and annual pumpage reports are due by March 31, and the **Consumer Confidence Report** is due by July 1.

Also enclosed is the document "2015 Monitoring and Reporting Requirements." This provides additional details about monitoring and reporting requirements. If you have any questions, please contact us using the information below.

Michael F. Prysby, P.E., District Engineer
Lansing District Office
Office of Drinking Water and
Municipal Assistance
517-290-8817

Adam Rosenthal, EQA
Lansing District Office
Office of Drinking Water and
Municipal Assistance
517-284-6644

Enclosure
cc/encl: Mr. Robert Bisnick, City Of Flint
Genesee County Health Department

2015 Monitoring Schedule

FLINT, CITY OF **WSSN: 02310**

Collect samples early in the monitoring period. This schedule reflects your expected routine monitoring and is subject to change. To receive credit for monitoring, include the **WSSN, Site Code, and County** on your request for analysis form. Collect Bacteriological and Automated Partial Chemistry samples close to the shipping time and send overnight delivery. Send all sample results to your Department of Environmental Quality (DEQ) district office unless you use the DEQ laboratory. Test codes, sample units, and costs are listed to help you complete the DEQ laboratory form. Prices are subject to change without notice. The DEQ laboratory is closed on state holidays.

Location: Distribution System

Sample Type	Collect Samples According to the ...	# Samples/ Frequency	Collect	Site Code	Fee	Unit Number	Test Code
Bacteriological – coliforms	TCR Sampling Site Plan	100/Monthly	**Monthly**	DIST	$16.00	30	BPTC
Chlorine Residual	DBP Monitoring Plan	If serving chlorinated water, measure the residual disinfectant level at the same point and at the same time as the bacteriological sample and report the average to the DEQ.					
Total Trihalomethanes	DBP Monitoring Plan	8/3 months	**During February, May, August and November 2015**	See DBP Monitoring Plan	$65.00	36VO	CXTM
Haloacetic Acids		8/3 months	**During February, May, August and November 2015**	See DBP Monitoring Plan	$130.00	36HA	CXHA
Water Quality Parameters	Representative Sites	25/Quarterly	**Quarterly**	DIST	Various	Various	Various
Lead Copper for Corrosion Control	Lead and Copper Sampling Pool	60/6 months	Between 1/1 and 6/30/2016	DIST	$26.00	36CC	CCUB

Community Water Supply
2015 Monitoring and Reporting Requirements

Please Monitor Early: Collect samples early in the monitoring period (month, quarter, year) of the year indicated on the schedule. Bacteriological and partial chemistry samples should be collected close to the shipping time and sent overnight delivery to assure sample holding times are not exceeded (30 and 48 hour hold times respectively). We also recommend avoiding mailing bacteriological samples immediately preceding or following a holiday because samples tend to exceed the 30 hour hold time. When this occurs, a repeat sample must be collected as soon as possible upon notification.

If you use a private laboratory please report the results to us within the first ten days of the month following the month that you received the results. A list of certified laboratories is available on request. If samples are not collected as indicated on your monitoring schedule, you will incur a monitoring violation and possibly a fine. For information on the fines policy, visit http://michigan.gov/deqwater. Click on Drinking Water, Community Water Supply, and Administrative Fines (under Laws and Rules).

To receive credit for monitoring, you must include the **"WSSN"** (water supply serial number), the **"Site Code,"** and the **"County"** when you submit samples for analysis. Site codes are listed on your monitoring schedule.

Special Instructions If You Use The DEQ Laboratory: Bottles will NOT be mailed automatically. To order bottles, call the DEQ Laboratory at 517-335-8184 or download the form EQP 2301 *Requisition for Water Sample Units* from www.michigan.gov/deq. Click on Key Topics, Laboratory Services, Drinking Water, Obtaining The Necessary Sampling Units, and 'test list'. Please note that the DEQ laboratory is closed on most state holidays. The DEQ laboratory prices are subject to change without notice.

Special Instructions For Automated Partial Chemistry, VOC and TTHM Samples: These sample bottles must be cooled and preserved during shipment to the laboratory. If you use the DEQ laboratory, you will receive the ice pack, acid dropper (if necessary) and small cooler when you request the bottles. Samples must be preserved correctly to be used for compliance purposes. To avoid resampling follow instructions contained with the sample bottle. If you would like more information, contact the DEQ lab, at 517-335-8184, or contact this office.

Cyanide: Previously, supplies that chlorinated the water were waived from monitoring for cyanide. The U.S. EPA now requires all supplies to sample the entry point for cyanide.

UCMR3 Monitoring: You may have monitoring requirements in 2015 under the third Unregulated Contaminant Monitoring Rule (UCMR3). The U.S. EPA will contact you directly if your water supply is required to monitor in 2015. A list of laboratories certified to analyze the samples collected for UCMR3 is available at http://water.epa.gov/lawsregs/rulesregs/sdwa/ucmr/ucmr3/upload/lablist.pdf. Contact the U.S. EPA with questions.

Reminder if Lead and Copper Monitoring Due This Year: Provide individual lead tap results to people who receive water from sites that you sampled, even if lead was not detected, within 30 days of learning the results. Send us a certification that you met all the delivery requirements along with a sample copy of the customer notice within 3 months after the end of the monitoring period. Water supplies that failed to distribute the Consumer Notice of Lead Results must include the following statement in their CCR, "During the year, we failed to provide lead results to persons served at the sites that were tested as required by the Lead and Copper Rule." To download the *Lead and Copper Report and Consumer Notice of Lead Result Certificate* in Microsoft Word or PDF format, visit www.michigan.gov/deqwater. Click on Drinking Water, Community Water Supply, and Reporting Forms (under Manuals, Forms & Brochures).

Annual Reports: These reports are due to this office each year.

- The **Cross Connection Report**, due by March 31, describes the status of your local cross connection control program. Manufactured housing communities are exempt from this requirements until 2016.

  Each year, water supplies must submit this report, even if a formal program has not been implemented. If cross connections do not exist in your water system, indicate so on the report. Download the Cross Connection Report form from http://michigan.gov/deqwater. Click on Drinking Water, Community Water Supply, Reporting Forms (under Manuals, Forms & Brochures). Instructions are included with the form.

- The **Annual Pumpage/Usage Report**, due by March 31, is required of water supplies that do not submit monthly operation reports.

  This summary of water pumpage and water use must be submitted by each water supply that does not submit a monthly operation report. To manage our natural resources, pumpage data are compiled to determine water use demands in Michigan. Download the Annual Pumpage/Usage Report form from http://michigan.gov/deqwater. Click on Drinking Water, Community Water Supply, Reporting Forms (under Manuals, Forms & Brochures). Please be sure to indicate the appropriate units on the report (e.g. million gallons or gallons).

- The **Consumer Confidence Report**, due by July 1 to your customers, to your local health department and to this office, describes the quality of the water and characterizes the risks, if any, from exposure to contaminants detected..

  Electronic delivery methods may be used to distribute the CCR to bill-paying customers, provided the method is direct. A paper copy must be delivered to bill-paying customers who request it or known to be unable to receive the CCR electronically. For more information on e-delivery, visit www.michigan.gov/deqwater. Click on Drinking Water, Community Water Supply, Consumer Confidence Report Rule (under Laws and Rules).

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

PERMIT APPLICATION FOR WATER SUPPLY SYSTEMS

(CONSTRUCTION - ALTERATION - ADDITION OR IMPROVEMENT) AS DESCRIBED HEREIN

Required under the Authority of 1976 PA 399, as amended

ENTERED

This application becomes an Act 399 Permit only when signed and issued by authorized Michigan Department of Environmental Quality (DEQ) Staff. See instructions below for completion of this application.

1. **Municipality or Organization, Address and WSSN** that will own or control the water facilities to be constructed. This permit is to be issued to: City of Flint 4500 N. Dort Highway Flint, MI 48505 **WSSN:** 02310	Permit Stamp Area (DEQ use only) MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY PERMIT NO. W 151104 OCT 28 2015 EXAMINED AND APPROVED FOR COMPLIANCE WITH ACT 399, P.A. 1976	
2. **Owner's Contact Person** (provide name for questions): Contact: Brent Wright Title: Water Plant Supervisor Phone: 810.787.6537		
3. **Project Name** (Provide phase number if project is segmented): Flint WTP Phase II, Segment 4 Corrosion Control	4. **Project Location** (City, Village, Township): Flint, MI	5. **County** (location of project): Genesee

ISSUED UNDER THE AUTHORITY OF THE DIRECTOR OF THE DEPARTMENT OF ENVIRONMENT QUALITY

cc: DEQ RESOURCE MANAGEMENT DIVISION OCT 16 2015 LANSING DISTRICT

Issued by: Michael Prysby

Reviewed by: Michael Prysby

☐ **If this box is marked see attached special conditions.**

Instructions: Complete items 1 through 5 above and 6 through 21 on the following pages of this application. Print or type all information except for signatures. Mail completed application, plans and specifications, and any attachments to the DEQ District Office having jurisdiction in the area of the proposed construction.

Please Note:

a. This **PERMIT** only authorizes the construction, alteration, addition or improvement of the water system described herein and is issued solely under the authority of 1976 PA 399, as amended.
b. The issuance of this **PERMIT** does not authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other DEQ permits, or approvals from other units of government as may be required by law.
c. This **PERMIT** expires two (2) years after the date of issuance in accordance with R 325.11306, 1976 PA 399, administrative rules, unless construction has been initiated prior to expiration.
d. Noncompliance with the conditions of this permit and the requirements of the Act constitutes a violation of the Act.
e. Applicant must give notice to public utilities in accordance with 1974 PA 53, (MISS DIG), being Section 460.701 to 460.718 of the Michigan Compiled Laws, and comply with each of the requirements of that Act.
f. All earth changing activities must be conducted in accordance with the requirements of the Soil Erosion and Sedimentation Control Act, Part 91, 1994 PA 451, as amended.
g. All construction activity impacting wetlands must be conducted in accordance with the Wetland Protection Act, Part 303, 1994 PA 451, as amended.
h. Intentionally providing false information in this application constitutes fraud which is punishable by fine and/or imprisonment.
i. Where applicable for water withdrawals, the issuance of this permit indicates compliance with the requirements of Part 327 of Act 451, Great Lakes Preservation Act.

6. **Facilities Description** – In the space below provide a detailed description of the proposed project. Applications without adequate facilities descriptions **will be returned**. SEE EXAMPLES BELOW. Use additional sheets if needed.

The project entails installation of phosphate feed systems at both Control Station #2 (CS#2) and Pump Station #4 (PS#4). Feed at CS#2 will provide the ability to add phosphate for corrosion control to finished water supplied from the Detroit Water & Sewer Department (DWSD). Feed at PS#4 will provide the ability to add phophate to finished water to supply from either the Flint River or Lake Huron via the Karegondi Water Authority (KWA). Both feed systems are temporary systems until the planned filter transfer pump station is constructed. A permanent phosphate feed system will be constructed as part of that contract.

The feed rate will be proportionally controlled based on the water flow rate and will be tied to the existing SCADA system. See attached basis of design for more detailed information.

EXAMPLES – EXAMPLES – EXAMPLES – EXAMPLES – EXAMPLES – EXAMPLES	
Water Mains	500 feet of 8-inch water main in First Street from Main Street north to State Street. **OR** 250 feet of 12-inch water main in Clark Road from an existing 8-inch main in Third Avenue north to a hydrant.
Booster Stations	A booster station located at the southwest corner of Third Avenue and Main Street, and equipped with two, 15 Hp pumps each rated 150 gpm @ 200 feet TDH. Station includes backup power and all other equipment as required for proper operation.
Elevated Storage Tank	A 300,000 gallon elevated storage tank located in City Park. The proposed tank shall be spherical, all welded construction and supported on a single pedestal. The tank shall be 150 feet in height, 40 feet in diameter with a normal operating range of 130 – 145 feet. The interior coating system shall be ANSI/NSF Standard 61 approved or equivalent. The tank will be equipped with a cathodic protection system, and includes a tank level control system with telemetry.
Chemical Feed	A positive displacement chemical feed pump, rated at 24 gpd @ 110 psi to apply a chlorine solution for Well No. 1. Chlorine is 12.5% NaOCL, ANSI/NSF Standard 60 approved and will be applied at a rate of 1.0 mg/l of actual chlorine.
Water Supply Well	Well No. 3, a 200 foot deep well with 170 feet of 8-inch casing and 30 feet of 8-inch, 10 slot screen. The well will be equipped with a 20 Hp submersible pump and motor rated 200 gpm @ 225 feet TDH, set at 160 feet below land surface.
Treatment Facilities	A 5 million gpd water treatment plant located at the north end of Second Avenue. The facility will include 6 low service pumps, 2 rapid mix basins, 4 flocculation/sedimentation basins, 8 dual media filters, 3 million gallon water storage reservoir and 6 high service pumps. Also included are chemical feed pumps and related appurtenances for the addition of alum, fluoride, phosphate and chlorine.

General Project Information – Complete all boxes below.

7. Design engineer's name, engineering firm, address, phone number, and email address:

Jeremy Nakashima, PE
Lockwood, Andrews and Newnam, Inc.
1311 South Linden Rd, Suite B
Flint, MI 48532
jnnakashima@lan-inc.com

8. Indicate who will provide project construction inspection:
☐Organization listed in Box 1.
☒Engineering firm listed in Box 7.
☐Other - name, address, and phone number listed below.

9. Is a basis of design attached?
☒YES ☐NO

If no, briefly explain why a basis of design is not needed.

10. Are sealed and signed engineering plans attached?
☒YES ☐NO

If no, briefly explain why engineering plans are not needed.

11. Are sealed and signed construction specifications attached?
☒YES ☐NO

If specifications are not attached, they need to be on file at DEQ.

12. Were Recommended Standards for Water Works, Suggested Practice for Water Works, AWWA guidelines, and the requirements of Act 399 and its administrative rules followed?
☒YES ☐NO

If no, explain which deviations were made and why.

13. Are all coatings, chemical additives and construction materials ANSI/NSF or other adequate 3rd party approved?
☒YES ☐NO

If no, describe what coatings, additives or materials did not meet the applicable standard and why.

14. Are all water system facilities being installed in the public right-of-way or a dedicated utility easement? (For projects not located in the public right-of-way, utility easements must be shown on the plans.)
☒YES ☐NO

If no, explain how access will be obtained.

15. Is the project construction activity within a wetland (as defined by Section 324.30301(d)) of Part 303, 1994 PA 451?
☐YES ☒NO

If yes, a wetland permit must be obtained.

16. Is the project construction activity within a 100-year floodplain (as defined by R 323.1311(e)) of Part 31, 1994 PA 451, administrative rules?
☐YES ☒NO

If yes, a flood plain permit must be obtained.

17. Is the project construction activity within 500 feet of a lake, reservoir, or stream?
☐YES ☒NO

If yes, a Soil and Erosion Control Permit must be obtained or indicate if the owner listed in box 2 of this application is an Authorized Public Agency (Section 10 of Part 91, 1994 PA 451) ☐ Owner is APA.

18. Will the proposed construction activity be part of a project involving the disturbance of five (5) or more acres of land?
☐YES ☒NO
If yes, is this activity regulated by the National Pollutant Discharge Elimination System storm water regulations?
☐YES: NPDES Authorization to discharge storm water from construction activities must be obtained.

☒NO: Describe why activity is not regulated:
Please call 517-241-8993 with questions regarding the applicability of the storm water regulations.

19. Is the project in or adjacent to a site of suspected or known soil or groundwater contamination?
☐YES ☒NO

If yes, attach a copy of a plan acceptable to the DEQ for handling contaminated soils and/or groundwater disturbed during construction. Contact the local DEQ district office for listings of Michigan sites of environmental contamination.

20. IF YOU ARE A CUSTOMER/WHOLESALE/BULK PURCHASER, COMPLETE THE FOLLOWING

1) Name and WSSN of source water supply system (seller) _____

2) Does the water service contract require water producer/seller to review and approve customer/wholesale/bulk purchaser water system construction plans?
☐YES ☐NO

If yes to #2, the producer/seller approval letter must be attached when submitted to DEQ.

21. **Owner's Certification** The owner of the proposed facilities or the owner's authorized representative shall complete the owner's certification. It is anticipated that the owner will either be a governmental agency (city, village, township, county, etc.) or a private owner (individual, company, association, etc.) of a Type I public water supply.

OWNER'S CERTIFICATION

I, BRENT F WEIGHT (print) (name), acting as the PLANT SUPERVISOR (print) (title/position) for CITY OF FLINT WATER PLANT (print) (entity owning proposed facilities) certify that this project has been reviewed and approved as detailed by the Plans and Specifications submitted under this application, and is in compliance with the requirements of 1976 PA 399, as amended, and its administrative rules.

Signature* 10-16-2015 Date (810) 787-8537 Phone

*Original signature only, no photocopies will be accepted.

PROJECT BASIS OF DESIGN – FOR WATER MAIN PROJECTS

PROJECT NAME: Flint WTP Phase II, Segment 4 Corrosion Control

For this PROJECT the following information must be provided per Act 399 unless waived by the Department. For projects other than water main installation, or if additional space is needed, attach separate sheet(s) with detailed Basis of Design calculations.

A. A general map of the initial and ultimate service areas
☒ Included on engineering plans ☐ Attached separately

B. Number of service connections served by this permit application all customers

C. Total number of service connections ultimately served by entire project all customers

D. Residential Equivalent Units (REUs) served by this permit application _____

E. Total Residential Equivalent Units (REUs) ultimately served by entire project _____

F. Water flow rates for proposed project based on REUs listed in "D" and "E" above

1. Initial design average day flow (mgd)	18.3
2. Initial design maximum day flow (mgd)	25.4
3. Total design average day flow (mgd)	24.0
4. Total design maximum day flow (mgd)	36.0
5. Required fire flows: (1)	_____ gpm for _____ hours

G. Actual flows and pressures of existing system at the connection point(s) (2)

_____ gpm at _____ psi
_____ gpm at _____ psi
_____ gpm at _____ psi
_____ gpm at _____ psi

H. Estimated minimum flows and pressures within the proposed water main system (3)

_____ gpm at _____ psi

(1) Every water system must decide what levels of fire fighting flows they wish to provide. Fire flow should be appropriate for the area (residential, commercial, industrial) being served by the project. Typical fire flow rates can be obtained from the water supply, local fire dept., ISO or AWWA. The water system must then be designed to be able to provide the required fire flows while maintaining at least 20 psi in all portions of the distribution system.

(2) Flows and pressures at the connection points must be given to determine if the existing water main(s) are able to deliver water to the new service area. These numbers can be obtained from a properly modeled and calibrated distribution system hydraulic analysis or hydrant flow tests performed in the field. If more than one connection is proposed, list as needed.

(3) List what the estimated minimum flows can be expected in the proposed water mains based on estimated water demands, head losses, elevation changes and other factors that may affect flows, such as dead end mains.

City of Flint
Phase II, Segment 4 Corrosion Control
Basis of Design

Given that Flint will require lead and copper corrosion control and given that Detroit utilizes orthophosphate for their corrosion control methodology, and that Flint will be receiving Detroit water for the immediate future, orthophosphate is the appropriate corrosion control methodology for Flint. A dosage of 0.8 mg/l as PO_4 has been recommended for the Detroit water. Numerous utilities utilizing Lake Michigan water have a target dosage of 0.9 mg/l as PO_4. Therefore, a target dosage in the range of 0.8 to 0.9 mg/l appears appropriate.

It is expected that initially there will be a significant PO_4 demand in the system. This will require a significantly higher dosage until this demand is satisfied and the target residual can be maintained. We are therefore designing for capability of a maximum dosage of 1.5 mg/l.

The arriving Detroit water will likely have some residual PO_4 when it arrives at Flint. It has been reported that this residual will be approximately 0.4 mg/l. The system must therefore be capable of a minimum dosage of 0.4 mg/l.

Based upon the usage of 75% Phosphoric Acid and a flow range of 4 MGD to 25 MGD, with an average day of 16 MGD, the expected feed rate will be 1.35 to 32 gpd. Average Phosphoric Acid feed is expected to be 10.8 gpd, requiring 30 days storage of 325 gal. Phosphoric acid will be stored in delivered totes and will be placed with containment pallets for dual containment.

Orthophosphate will need to be applied at two locations. Detroit water will enter the Flint system at Control Station CS2, and supplementary phosphate will be applied there. However, on occasion some incoming water may need to be diverted to the Dort Reservoir, bypassing CS2. This water would then be introduced to the system through High Service Pump Station PS4 and phosphate would be introduced at this location.

Lockwood, Andrews & Newnam, Inc.

PLANNING

ENGINEERING

PROGRAM MANAGEMENT

Est. 1935

AUSTIN, TX
CHICAGO, IL
CLEARWATER, FL
COLLEGE STATION, TX
DALLAS, TX
FLINT, MI
FORT WORTH, TX
HOUSTON, TX
HUNTINGTON BEACH, CA
LAS VEGAS, NV
LOS ANGELES, CA
MIAMI, FL
MILPITAS, CA
PHOENIX, AZ
SACRAMENTO, CA
SAN ANTONIO, TX
SAN MARCOS, TX
WACO, TX

TRANSMITTAL

Filing Data Code 1-07

☐ UPS ☐ FEDEX ☐ DELIVERY SERVICE ☐ HAND DELIVER ☐ OVERNIGHT ☐ REGULAR MAIL ☐ PICK-UP ☒ OTHER Extranet(To PM)

To: Michael Prysby	**Date** 10-16-13
	Project Number 130-10701-001
Company: MDEQ	**Routing:**
Address: 525 WEST ALLEGAN STREET Lansing, MI 48933	
Project: City of Flint Water Treatment Plant Improvements.	

We Are Sending You:		These Are Transmitted:
☐ Shop Drawings	☐ Reports	☐ As Requested
☐ Original Drawings	☐ Submittal Data	☒ For Your Use
☒ Prints	☐ Proposal	☒ For Review and Comment
☐ Specifications	☐ As Noted	☐ For Your Signature

Quantity	Description
3	Full Set of Plans for Ph2-Seg4 Corrosion Control
1	Act 399 Permit Application
1	11x17 Set of Plan for Ph2-Seg4 Corrosion Control

Remarks

These plans have been modified slightly from the set electronically submitted last night.

We look forward to your comments and approval.

Thanks.

DEQ
RESOURCE MANAGEMENT DIVISION
OCT 16 2015
LANSING DISTRICT

Distribution	Prepared By
1- Mike Glasgow 2- Brent Wright 3- File	Samir Matta, PE

1311 SOUTH LINDEN ROAD
SUITE B
FLINT, MI 48532
TEL 810.820.2682
FAX 810.820.2703
www.lan-inc.com

If enclosures are not as noted, kindly notify us at once.

B-018-11

Sample ID	Virginia Tech-First draw Lead (ppb)	MDEQ Lead (ppb)	WARD	ZipCode
8	40.6	42	9	48507
15	4.358	ND	9	48507
16	24.4	5	5	48505
19	2.484	ND	9	48507
26	16.52	21	5	48505
27	1.984	3	1	48505
29	5.519	3	2	48504
30	0.639	2[4]	4	48506
31	8.2[3]	8	6	48503
33	66.88	42	6	48503
34	20.41	5	1	48505
36	5.06	3	8	48503
79	5.8[1]	5[2]	6	48503
134	10.6	6	9	48507
148	2.325	22	9	48507
157	7.2	4	7	48503
182	15.55	ND	6	48504
207	8.471	5	7	48503
208	11.5	6	9	48507
274	6.601	2	7	48503
291	2.261	ND	3	48506

[1]The address was sampled two times and it represents the average value of 5.2 ppb and 6.3 ppb;
[2]The address was sampled two times and it represents the average value of 2 ppb and 8 ppb;
[3]The address was sampled two times and it represents the average value of 6.1 ppb and 10.3 ppb;
[4]The address was sampled two times and it represents the average value of 2 ppb and 2 ppb;
ND = Not Detectable.

flintwaterstudy.org

10 COPIES

Muchmore, Dennis (GOV)

From: Muchmore, Dennis (GOV)
Sent: Monday, August 3, 2015 5:38 PM
To: Muchmore, Dennis (GOV)
Subject: FW: Updated Memo on Water Coalition Questions - July 29
Attachments: Flint Testing and EBLLs_2.xlsx

For meeting with Pastors and community leaders.

From: Lyon, Nick (DCH)
Sent: Friday, July 31, 2015 10:57 AM
To: Muchmore, Dennis (GOV);
Subject: Re: Updated Memo on Water Coalition Questions - July 29

Our Public Health staff followed up a bit more on the lead question. Below is their email update to me.

From: Grijalva, Nancy (DCH)
Sent: Wednesday, July 29, 2015 11:23 AM
To: Lyon, Nick (DCH)
Subject: FW: Director's Office Assignment -- Flint - need update asap
FYI.....
-----Original Message-----
From: Peeler, Nancy (DCH)
Sent: Tuesday, July 28, 2015 2:57 PM
To: Anderson, Paula (DCH); Miller, Corinne (DCH); Travis, Rashmi (DCH); Moran, Susan (DCH); Grijalva, Nancy (DCH); Fink, Brenda (DCH)
Cc: Priem, Wesley F. (DCH); Dykema, Linda D. (DCH); Bouters, Janese (DCH); Barr, Jacqui (DCH)

Subject: RE: Director's Office Assignment -- Flint - need update asap

I apologize for the delay in responding more specifically to this assignment, it took some time to review our Childhood Lead Poisoning Prevention program data to see if it might contribute to the understanding of the situation in Flint with their water supply. Here is what we found:

We looked at lead testing results for May 2014-April 2015, which is the 12 month time frame just after Flint started drawing their water from the river (water source changed in April 2014).

We compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched. Per the attached charts –

- Lead testing rates remained about the same from year to year (chart on the right).
- There was a spike in elevated blood lead tests from July-September 2014 (chart on the left, gold line).
- However that pattern was not terribly different from what we saw in the previous three years, especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).
- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more

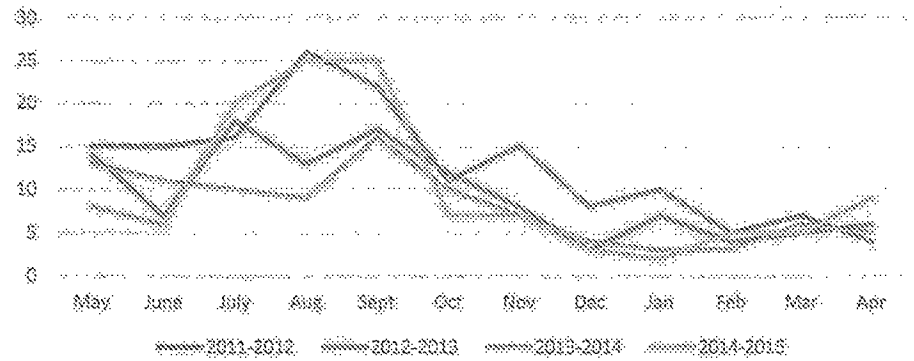
often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspect that the summer data spike may be related to this effect.

- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015.

So upon review, we don't believe our data demonstrates an increase in lead poisoning rates that might be attributable to the change in water source for Flint. We recognize that lead exposure via the water is only a small piece of what may be happening for families in Flint, however, we hope the information is helpful.

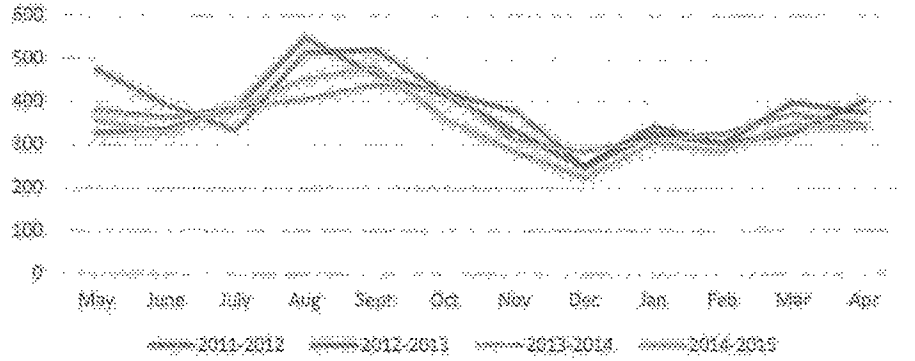
Nancy Peeler

City of Flint, Children less than 16 years of age
with First-Time Elevated Blood Lead Levels

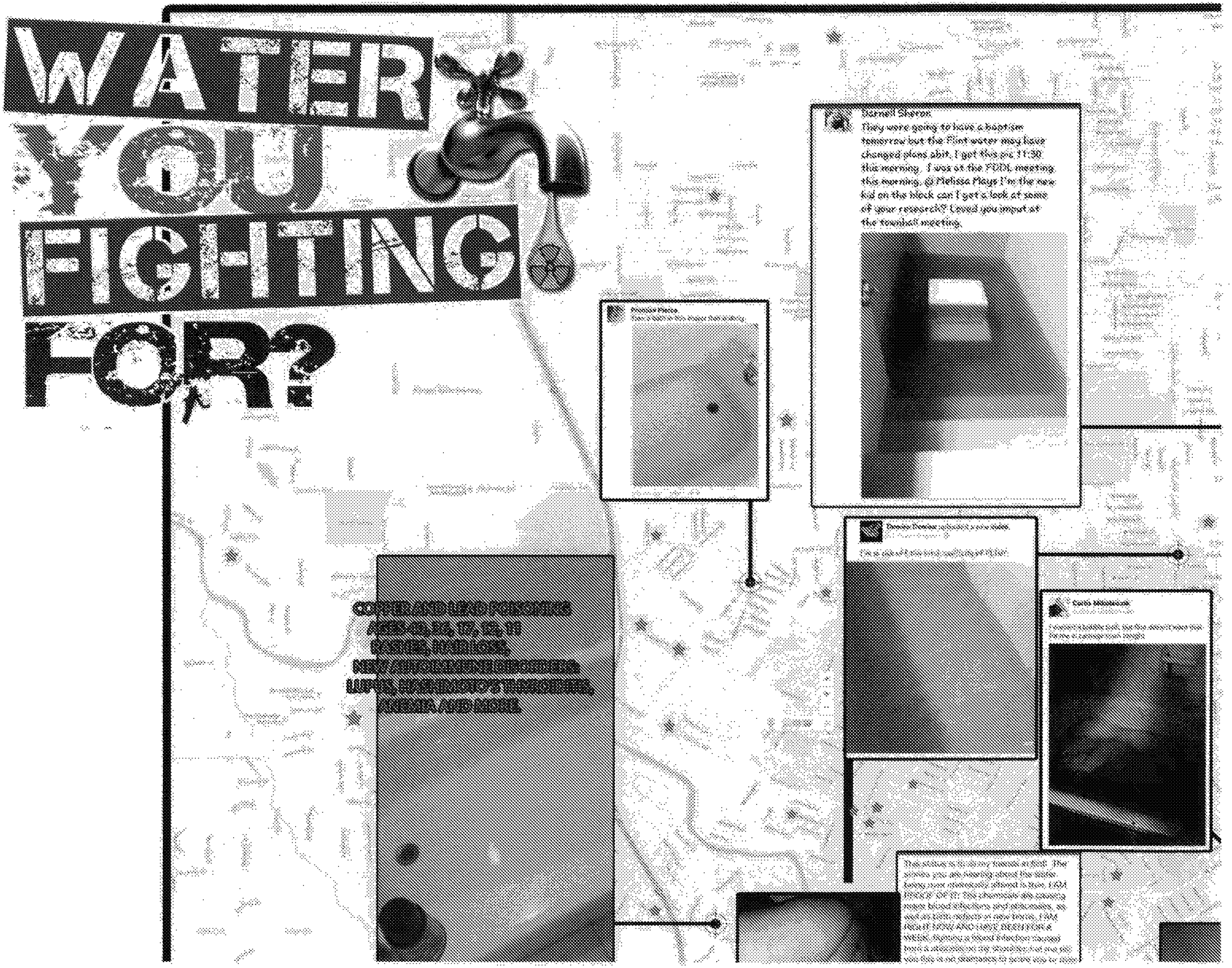


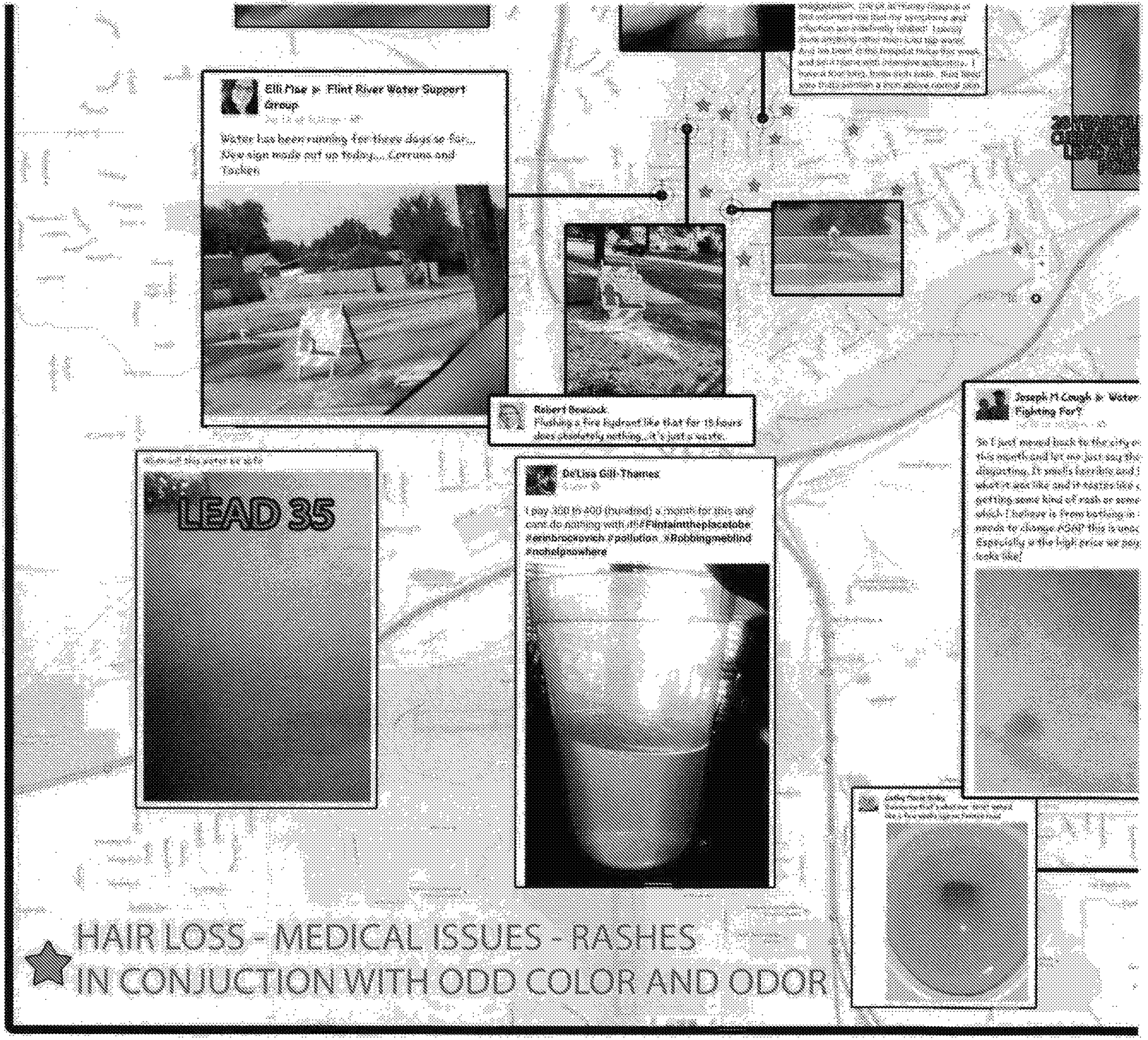
	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
2011-2012	15	15	16	26	22	11	15	8	10	5	7	4
2012-2013	14	7	18	13	17	12	8	3	7	4	5	6
2013-2014	13	11	10	9	16	10	7	4	3	3	6	5
2014-2015	8	6	20	25	25	7	7	3	2	3	5	9

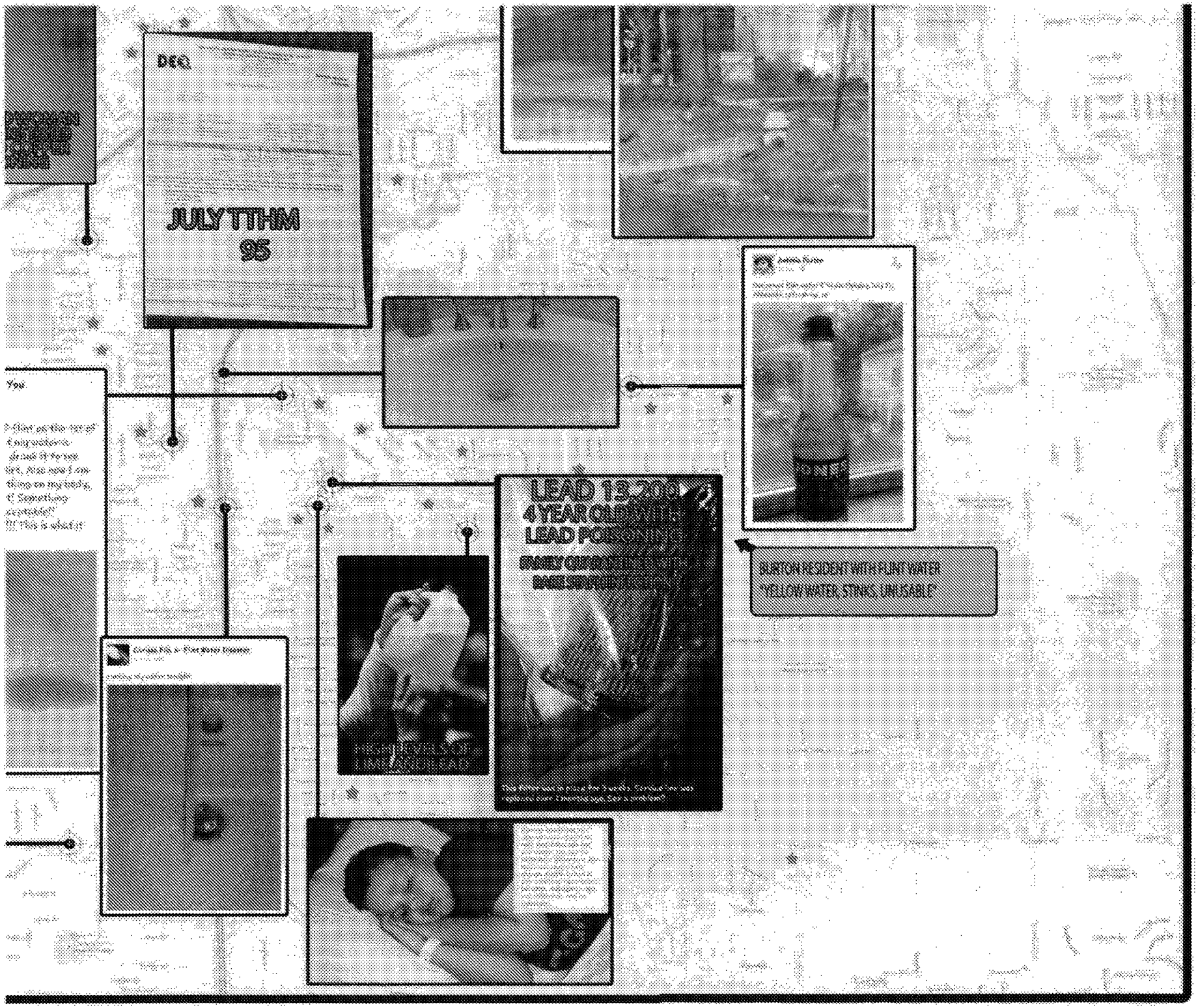
City of Flint, Children less than 16 years of age
Tested for Lead Poisoning

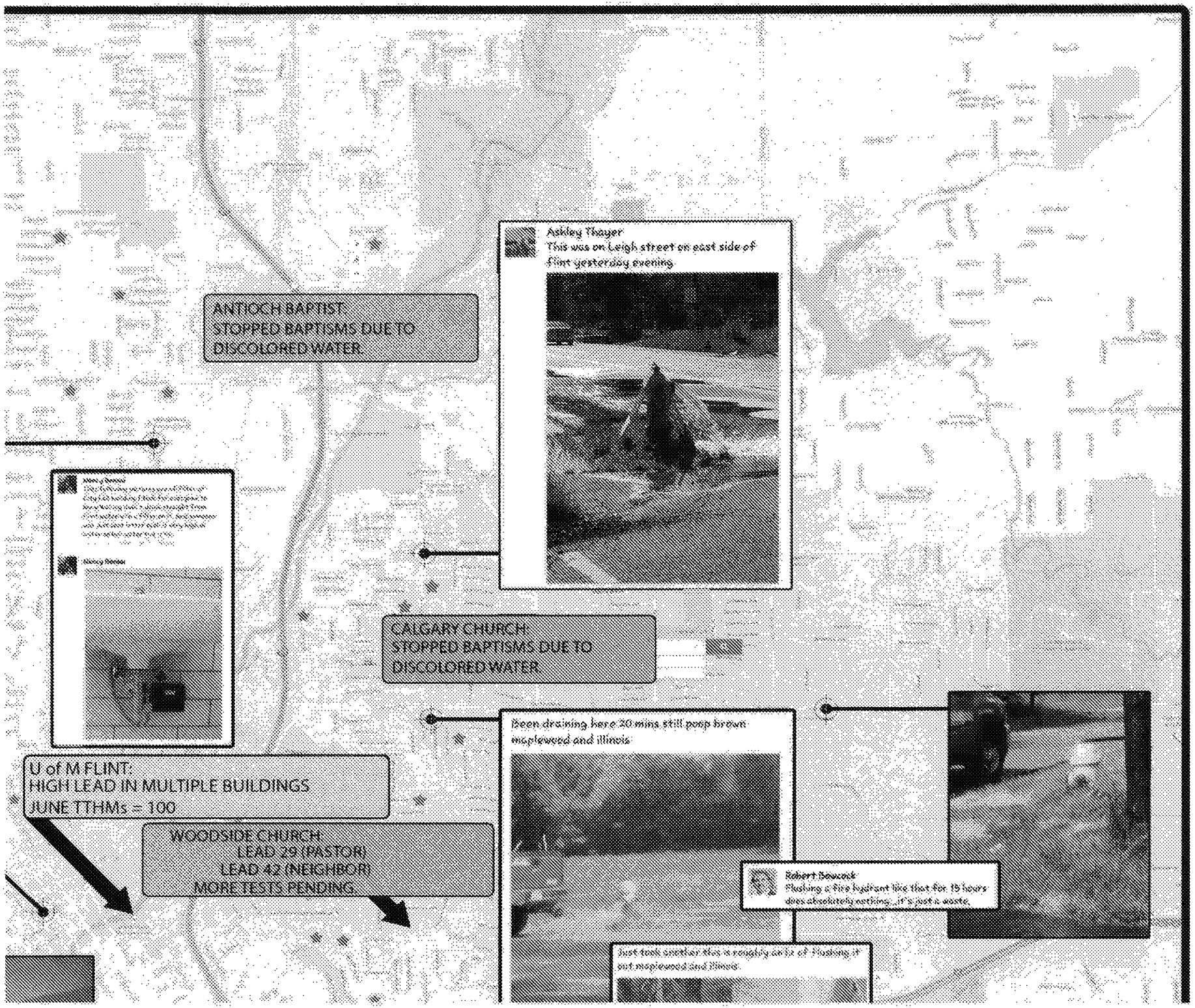


	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
2011-2012	474	393	332	513	520	420	379	249	343	303	399	375
2012-2013	338	338	383	550	464	417	332	246	328	303	328	402
2013-2014	380	362	385	404	438	427	310	283	313	325	371	346
2014-2015	356	329	386	452	480	361	283	224	305	287	348	339


WATER
YOU
FIGHTING
FOR?
Darnell Sheron
They were going to have a baptism tomorrow but the Flint water may have changed plans shit. I got this at 11:30 this morning. I was at the FUDL meeting this morning. @ Melissa Mays I'm the new kid on the block can I get a look at some of your research? Loved you input at the townhall meeting.


Elli Mae ▶ Flint River Water Support Group
Water has been running for three days so far... New sign made out up today.... Cerruna and Tucker.
Robert Bowcock
Flushing a fire hydrant like that for 18 hours does absolutely nothing...it's just a waste.
LEAD 35
DeLisa Gill-Thames
I pay 300 to 400 (hundred) a month for this and cant do nothing with it!! #Flintinttheplacetobe #erinbrockovich #pollution #Robbingmeblind #nohelpnowhere
HAIR LOSS - MEDICAL ISSUES - RASHES
IN CONJUCTION WITH ODD COLOR AND ODOR


DEQ
JULY TTHM
95
LEAD 15 200
4 YEAR OLD
LEAD POI
BURTON RESIDENT WITH FLINT WATER
"YELLOW WATER, STINKS, UNUSABLE"


ANTIOCH BAPTIST:
STOPPED BAPTISMS DUE TO
DISCOLORED WATER.
Ashley Thayer
This was on Leigh street on east side of
Flint yesterday evening
CALGARY CHURCH:
STOPPED BAPTISMS DUE TO
DISCOLORED WATER.
U of M FLINT:
HIGH LEAD IN MULTIPLE BUILDINGS
JUNE TTHMs = 100
WOODSIDE CHURCH:
LEAD 29 (PASTOR)
LEAD 42 (NEIGHBOR)
MORE TESTS PENDING.
Been draining here 20 mins still poop brown
maplewood and illinois
Robert Bowcock
Flushing a fire hydrant like that for 15 hours
does absolutely nothing...it's just a waste.
Just took another pic is roughly an hr of flushing it
out maplewood and Illinois

Shekter Smith, Liane (DEQ)

From: Shekter Smith, Liane (DEQ)
Sent: Tuesday, August 25, 2015 1:56 PM
To: 'lwalters313@gmail.com'
Cc: Busch, Stephen (DEQ); Devereaux, Tracy Jo (DEQ)
Subject: Follow Up from our Aug. 4th meeting

Dear Ms. Walters,

I wanted to update you regarding our Department's findings related to questions raised during our meeting at the Governor's office on August 4. I apologize for the delay in getting back to you.

Lead and Copper Monitoring

Regarding Flint lead and copper compliance monitoring for the January – June 2015 period, the City has confirmed that all lead and copper samples collected throughout the City, whether routine sites or customer requests, were sent to the State of Michigan lab for analysis. Individual sample results are provided to the property owner within 30 days of receiving the lab results in accordance with the Michigan Safe Drinking Water Act (Public Act 399, 1976 Administrative Rule 410(5). Results from the State of Michigan lab are provided directly to our Office.

Staff have confirmed that the lead 90th percentile compliance calculation of 11 parts per billion is based on 69 samples that met the appropriate sampling location site criteria, and met the sample collection site and collection protocol requirements of the Safe Drinking Water Act for this monitoring period. A minimum of 60 samples were required for this monitoring period. As indicated during the meeting, the City's sampling for lead complies with the Action Level standard of 15 parts per billion, but based on the population served by the City and these results, the City will need to make a recommendation to the MDEQ on how they will fully optimize their corrosion control treatment. These next steps continue to follow the requirements of the Lead and Copper Rule.

Samples collected at your residence of 212 Browning Avenue were not included this compliance determination as you utilize a whole home filter. As stated in the Michigan Safe Drinking Water Act (Public Act 399, 1976 Administrative Rule 710a, Lead and Copper in tap water; monitoring requirements) "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment alters the water chemistry and water quality such that it is no longer representative of public water from the City's distribution system. Therefore, the City cannot use samples collected at your residence as part of its determination for public water system compliance with the lead or copper action level standard.

Sample Summary (samples taken at your residence)

For your information, we are providing the information that we've gathered regarding samples collected at your home. Our records indicate between February and June of this year there were six samples collected by either you or Mr. Mike Glasgow with the City of Flint, and submitted to the State Laboratory for analysis as follows:

February 11, Bathroom tap, collected at 10:20 AM by Mike Glasgow. This sample was analyzed for aesthetic metals (copper, iron, manganese, and zinc) which does not include lead analysis.

February 18, Kitchen tap, collected at 7:15 AM by you. This sample was analyzed for lead (104 parts per billion) and copper (non-detect).

February 25, Kitchen tap, collected at 10:26 AM by Mike Glasgow. This sample was analyzed for metals including lead. All results (including lead) were non-detect except for Barium 0.01 parts per million. The result for Barium was well below its maximum contaminant level of 2 parts per million.

March 3, Kitchen tap, collected at 6:00 AM by you. This sample was analyzed for lead (397 parts per billion) and copper (non-detect).

March 18, Kitchen tap, collected at 11:10 AM by Mike Glasgow. This sample was analyzed for lead (4 parts per billion) and copper (non-detect).

April 2, Pre-point of service, collected at 8:00 AM by you. This sample was analyzed for lead (707 parts per billion) and copper (110 parts per billion).

Lead Education/Outreach

As we discussed during the meeting, we support efforts to educate homeowners about the sources of lead in their private residence, provide guidance measures to reduce the potential for lead exposure, and provide information on resources for lead abatement. Along those lines, our Office has been in contact with the Department of Health and Human Services, Environmental Health Division, Healthy Homes Section and had some preliminary discussions about a public education and assistance campaign regarding household lead issues, guidance and abatement.

Lead monitoring by public water systems serves a dual purpose. The first purpose is to ensure the public water supply is adequately treating its water to address corrosion potential and help limit lead exposure. The second purpose is to inform homeowners about lead levels within their individual residence so that they can make educated choices regarding their own exposure risk.

pH Results

During the meeting concerns were also expressed regarding pH levels within customer plumbing systems. As you may know, pH has no associated contaminant level as it is simply a numeric scale used to specify the acidity or alkalinity of a solution. The City of Flint conducts daily monitoring of pH values on both its raw and finished (treated) water at the City's water treatment plant as part of its operations. The City is also required to conduct water quality parameter monitoring in the distribution system, which includes pH. Samples are analyzed in accordance with Standard Methods using properly calibrated analytical equipment. Results for pH from these samples are summarized below.

Since late April 2014 – June 2015, the following pH conditions were reported:

Water Treatment Plant – Finished Water plant tap pH range = 7.07 minimum to 9.9 maximum, overall average 7.7, measured daily. We believe the 9.9 is a one- time anomaly from softening treatment.

Distribution System – Water Quality Parameters taken from 25 sample sites located throughout and monitored quarterly
July – Sept. 2014: pH 7.71 average, range 7.56 – 7.86
Oct. – Dec. 2014: pH 7.88 average, range 7.62 – 8.10
Jan. – March 2015: pH 7.81 average, range 7.60 – 7.99
April – June 2015: pH 7.63 Average, range 7.48 – 7.80

In addition, the City's treated water contains alkalinity, which is a measurement of the buffering capacity of water to resist a change in pH. As you can see from the water quality parameter monitoring results above there has been very little change in pH within the City's distribution system. The pH levels described within customer site piping or premise plumbing systems are believed to be the result of onsite treatment and not representative of water quality shown to be occurring in the public water supply system.

Consumer Confidence Report

Finally, there was confusion during the meeting regarding the City's annual water quality report, the Consumer Confidence Report which we have since been able to clarify.

The City of Flint issued two separate Consumer Confidence Reports (CCR's) in 2015 covering the water quality data from 2014. One report was for the period of January – April 2014 when the City was obtaining water from Detroit (DWSD). And a second report was for the period April – December 2014 when the City was using the Flint River and its own Water Treatment Plant.

The CCR for DWSD water was mailed to customers in June. The Flint River based CCR was mailed to customers in mid-July, delayed due to issues with the printing contractor. We agree that having two separate reports caused confusion. We are working with the City to ensure both reports are posted to the City's website and both are made available when requested by customers. Should the City choose to create separate CCR's during the year that the City of Flint connects to the Karegnondi Water Authority we will work with the City to provide more clarity and try to have all material included in a single mailing.

The DWSD based CCR is the one community members had at the meeting, while the DEQ brought a copy of the Flint River based CCR. As separate and distinct sampling was done under each source, this explains the discrepancy in the values and monitoring periods being reported in the respective CCR's.

We appreciate your interest in these matters and hope this has addressed many of the questions brought up during our meeting. I would like to provide this information to both Dr. Sullivan and Ms. Mayes, but I do not have their contact information. I'm hoping you can share this with them and any others that may be interested.

Sincerely,

Liane J. Shekter Smith, P.E., Chief
Office of Drinking Water and Municipal Assistance
Michigan Department of Environmental Quality
517-284-6543

Integrated Resource Management, Inc.

lwalters813@gmail.com

February 17, 2015

Honorable Mayor Dayne Walling
& Members of the City Council
1101 South Saginaw Street
Flint, Michigan 48502

RE: City of Flint Municipal Drinking Water System
Initial Water Quality Investigation and Water Rate Issues

Ladies and Gentlemen:

I would like to thank the Office of the Mayor and City Council Members for extending such a warm welcome to me on my recent visit to the City of Flint this past weekend. Flint, Michigan enjoys a wonderful history and is part of what has made America strong. Clearly, the City of Flint is a community in transition.

While my initial visit focused on the water supply and immediate concerns for the health and safety of the community water supply, the following recommendations are broader in scope and are meant to be purely constructive.

Source Supply Evaluation

- Update and implement the Source Water Protection Plan.
- Define and identify groundwater quality and quantity inflow variables to the Flint River, specifically from the contaminated sources identified adjacent to the river.
- Define and identify reservoir release surface water quality and quantity variables to the Flint River, specifically from the Holloway Reservoir.
- Thoroughly evaluate the Detroit Water Supply quality characteristics.
- Conduct a detailed "cost of treatment assessment" of the Flint River Water Treatment Plant and compare it directly to the cost per unit of water purchased from Detroit. Publish said results and allow for public input as to the choice of water supplied based upon actual costs versus quality.

405 North Indian Hill Boulevard
Claremont, CA 91711-4600

(909) 621-1266
(909) 621-1196 Fax

Water Treatment Plant

In order to achieve immediate improvement to the water quality in the City of Flint, the following recommendations should be considered for implementation. Said recommendations are made with the intent of being migratory toward ultimate treatment of Lake Huron water from the Karegnondi Water Authority.

- Optimize the ozone disinfection system.
- Discontinue the use of sodium bisulfate to reduce pH in the ozone contact chamber.
- Trust the Plant Operator to use the optimum amount of ferric chloride required for coagulation.
- Investigate the use (jar tests) of ferric chloride and various water treatment polymers to reduce the use of corrosive ferric chloride.
- Discontinue the practice of lime softening. Continue the flow through the softener facility and consider adding a low dose of filter aid (additional polymer) as necessary during seasonal high turbidity.
- Discontinue the practice of fluoridation.
- Discontinue the practice of recarbonation.
- Discontinue the use of pre-filtration chlorine.
- Remove the anthracite coal media from the filter beds and replace it with a granular activated carbon (GAC) material. There are specifically engineered products for use in dual media filters. The use of GAC for organic Trihalomethanes (THM) precursor removal will immediately reduce THM formation in the drinking water supply.
- Post chlorinate disinfect based on residual demand requirements. Post chlorination will not be as intensive as the organic material will be dramatically reduced. The GAC will also serve as a barrier to other types of contamination events (petroleum, chemical, and algae blooms).

Distribution System Operations

- Complete development of the water distribution hydraulic flow model.
- Immediately increase distribution system velocities.
- Re-engineer the distribution system to encourage directional sediment transport for evacuation of system contaminates (sludge, biofilm, sediment, and other debris). This will further aid in chlorine demand management.

- Take at least one of the water system storage reservoirs out of service. Thoroughly clean the storage reservoir, perhaps a program of alternative years of service. With the 2 MG elevated tank, perhaps both reservoirs could be removed from service this year.

Budget & Rate Concerns

I have extremely limited information on the rate-setting program. My recommendations here are more about a process that aids communities with transparency. I have been advised to look at a recent study by one of the local colleges; further, I would need access to a detailed budget and expenditure accounting to provide more specific recommendations.

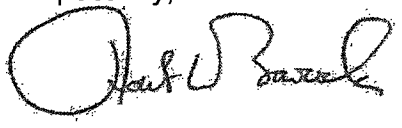
- Prepare a budget that accounts for all fixed/variable debts: loans, capital depreciation of infrastructure, retirement system obligations, etcetera. This will allow the community to understand exactly where it stands in relation to its debt obligations... before one drop of water is produced. The total of the compilation can then be divided among the consumers based on number and class size of services. It is simple, straightforward, and easily understood.

- Prepare a budget that accounts for all commodity/variable costs: salaries, chemicals, energy, contract services, etcetera. This will allow the community to understand exactly where it stands as it relates to the cost of water. Using historic production and sales numbers, project a water sales figure and divide the commodity costs among the units; this is the true cost of water.

Again, this recommendation letter is very limited in scope. I will continue to make myself available to you and members of the community to answer questions.

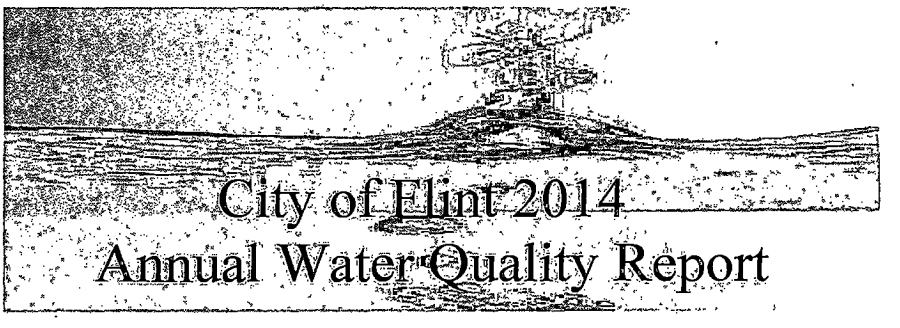
The City of Flint, while consulting with the Michigan Department of Environmental Quality, must begin to set its own parameters for compliance with the Safe Drinking Water Act. You have a very well qualified staff at the Flint River Surface Water Treatment Plant and they need to be given the latitude and flexibility to get the job done. I am not in anyway advocating violation of the Safe Drinking Water Act... indeed the recommendations I have made should help bring the City of Flint closer to the actual spirit of compliance as opposed to just meeting the statutory requirements.

Respectfully,



Bob Bowcock
Integrated Resource Management, Inc.

cc: Erin Brockovich
Melissa Mays
Pastor Alfred Harris
Howard Croft

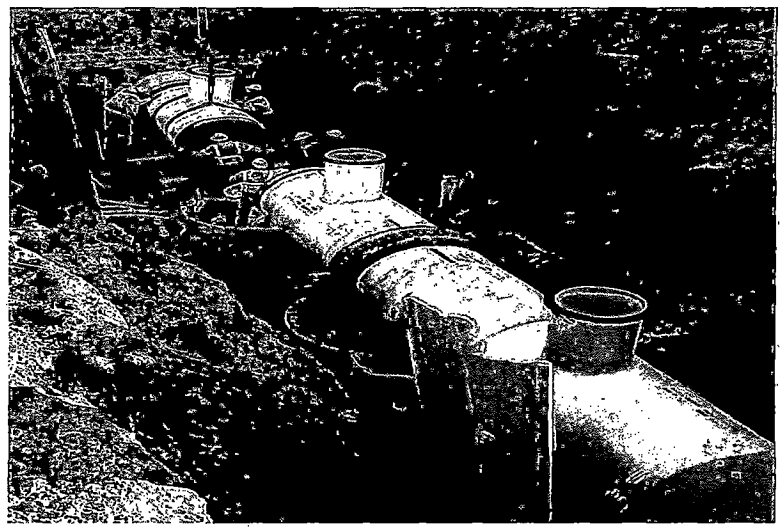


The Consumers Annual Water Quality Report provides important information about your drinking water. This report includes information about the source of the water, health information, a chart summarizing regulatory required testing results, and a table giving explanations of important terms to understand when viewing the test results. The City of Flint Department of Utilities is dedicated to providing quality drinking water to the residents of the community. The Flint Water Plant operates and maintains a certified drinking water laboratory to assure compliance with all state and federal regulations, and is committed to prompt and thorough notification to the consumers if there is any reason for concern about the quality of the drinking water. Information about your drinking water is available on the City of Flint web page at *www.cityofflint.com* or by calling the City of Flint Water Plant at (810) 787-6537. The Safe Drinking Water Hotline at (800) 426-4791 is a resource for health related questions and water quality issues. General drinking water information can also be found on the USEPA web site at www.epa.gov/safewater/.

Water Source

The City of Flint began using the Flint River as a water source in May of 2014. Flint is located roughly in the middle of the Flint River Watershed. The Flint River watershed includes Holloway Reservoir, C.S. Mott Lake, Kearsley Lake, and numerous streams and creeks that drain to these lakes or directly into the Flint River. The Michigan Department of Environmental Quality in partnership with the U.S. Geological Survey, and the City of Flint Utilities Department conducted a source water assessment in February 2004 to determine the susceptibility of potential contamination. The susceptibility rating is a seven-tiered scale ranging from "very low" to "very high" based primarily on geologic sensitivity, water chemistry, and contaminant sources. The Flint River source water intake is categorized as having a very high susceptibility to potential contaminant sources.

The use of the Flint River as a source water for the City of Flint Water Treatment Plant was a temporary move, driven largely by economics and the financial state of the City. The City of Flint joined the Karegnondi Water Authority (KWA) in 2010. The KWA consists of a group of local communities that decided to support and fund construction of a raw water pipeline to Lake Huron. The KWA will provide the City of Flint Water Treatment Plant with source water from Lake Huron. The KWA pipeline is currently under construction, and is scheduled to be completed by the end of 2016.



KWA pipeline construction

General Information

In order to ensure that tap water is safe to drink, the EPA prescribes regulations, which limit the amount of certain contaminants in water provided by the public water systems. The Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water, which must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791).

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water include:

- **Microbial contaminants;** such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- **Inorganic contaminants;** such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- **Pesticides and herbicides;** which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses.
- **Organic chemical contaminants;** including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems.
- **Radioactive contaminants;** which can be naturally occurring or be the result of oil and gas production and mining activities.

General Information (cont.)

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-comprised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Infants and young children are typically more vulnerable to lead in drinking water than the general population. It is possible that the lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Flint Department of Utilities is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. If you are concerned about elevated lead levels in your home's water, you can minimize your potential exposure to lead in your water by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

2014 & Current Drinking Water Issues

The City of Flint did experience drinking water issues in the summer of 2014. Issues began with areas of the city experiencing "rusty" water. This was largely due to the fact that the city distribution system contains hundreds of miles of cast iron pipe. As these pipes age and degrade, iron is released, causing the water to exhibit color. The change in source water, water main breaks, and routine maintenance to the system also contributed to this problem.

The City of Flint received violations from the Michigan Department of Environmental Quality (MDEQ). The violations included a total coliform and E. coli in August and September of 2014, and a corresponding total trihalomethanes (TTHM) violation in December of the same year. As the city distribution system testing began to detect bacteria, system flushing increased, and chlorine addition to the water at the treatment plant also increased. The resulting increased chlorine addition then resulted in the higher formation of trihalomethanes.

While facing these issues, the City of Flint took steps to confer with industry professionals and state regulators in regards to treatment plant operation and distribution system operation. In November, TTHM levels were below the Maximum contaminant level set forth in the Michigan Safe Drinking Water Act.

Moving Forward

The City of Flint has taken many steps to correct the underlying issues that resulted in the drinking water violations. Water Treatment Plant corrective actions that were taken immediately after the issues occurred included:

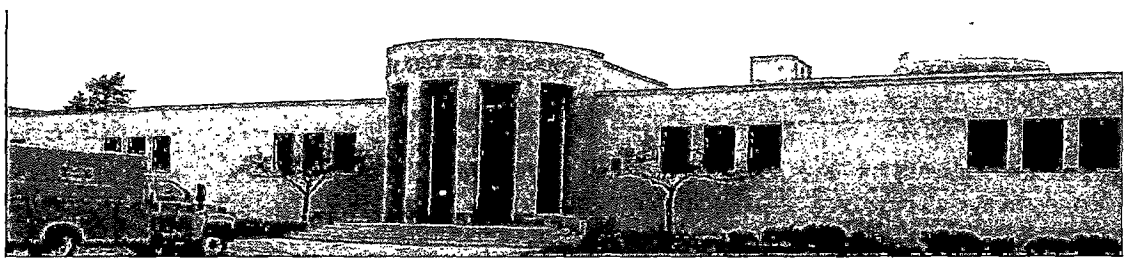
- Limiting the use of storage reservoirs during the warm weather months.
  - Warm water temperatures and water age are large contributors to the formation of THM's.
- Optimizing ozone pretreatment by updating control programming along with cleaning and inspection of the ozone generators.
  - Ozone is a powerful oxidant that provides a level of disinfection along with taste and odor control.
- Currently finalizing the installation of granular activated carbon (GAC) to the filtration process, which should be complete by the end of July 2015.
  - GAC will reduce THM's by removing the chemical precursors that react with chlorine to form the THM's.

Moving Forward (cont.)

Distribution system corrective actions that were enacted include:

- Increased water main flushing in an effort to alleviate stagnant water.
- Update distribution system water hydraulic model, to determine possible problem areas.
- Repaired or replaced several large water main valves, which were inhibiting the designed flow of water through the system.
- Planning and budgeting of 24' transmission water main repair in area of concern in the distribution system.
- Begin a complete distribution system evaluation of the 7000 water main valves that control the flow of water throughout the city. This project will be complete in July of 2015 and will provide information on where to proceed with further repairs and future projects.

The City of Flint is dedicated to resolving the issues that are facing the water system, and will continue to move forward as we prepare for the future. The City would like to thank all the residents and customers for their patience and understanding as we face the challenges ahead. The trials and tribulations that we have faced with the switch to the Flint River as a source water will prove to be important as we move ahead as a member of the KWA. Some of the distribution system issues experienced in 2014 while using the Flint River may also have been experienced with a different source water. As we continue to address the issues and take steps to be proactive, we can assure a future of quality drinking water in the City of Flint.



If you have any questions about this report or other concerns please contact the City of Flint Water Plant (810) 787-6537.

2014 Regulated Detected Contaminants
Monitored at Treatment Plant

Regulated Contaminant	Unit of Measure	MCLG	MCL	Highest Level Detected	Range of Detection	Violation
Inorganic Chemicals						
Fluoride	mg/L	4	4			No
Nitrate	mg/L	10	10	0.5	0 – 0.5	No
Metals						
Barium	mg/L	2	2	0.03	0.02 – 0.03	No
Selenium	mg/L	0.05	0.05	0.001	0 – 0.001	No
Pesticides						
Atrazine	mg/L	0.03	0.03	0.0003	0 – 0.0003	No
Organics						
Total Xylenes	mg/L	10	10	0.0005	0 – 0.0005	No

More than 100 other chemicals were monitored throughout the year that were not detected. The list of various classifications these chemicals are associated with include metals, carbamates, herbicides, pesticides, organics, and radiological.

Total Organic Carbon, TOC			
Regulated Contaminant	Required Monthly % Removal	Minimum Monthly % Removal	Monthly % Removal Ranges
Total Organic Carbon	50	53	53 - 68

Finished water and Source water samples are collected and analyzed monthly to calculate percent removal. Total organic carbon includes numerous chemicals that are found naturally in surface waters. Certain chemicals found in this group are precursors to the disinfection byproducts trihalomethanes and haloacetic acids.

Turbidity		
Highest Single Measurement (Cannot exceed 1NTU)	Lowest Monthly % of Samples Meeting Turbidity Limit (< 0.3 NTU in 95% of samples)	Violation
0.22	99.1	No

Turbidity is a measure of the apparent cloudiness of water, usually attributed to particulate matter. The turbidity data in the chart above is measured from the water plant tap every 4 hours. Turbidity is monitored throughout each stage of the treatment process in 4 hour intervals, and in one of the final stages of treatment, filtration, turbidity is monitored continuously with in line meters, and verified every 4 hours in the laboratory.

In 2014, the EPA required the City of Flint and other communities to conduct further testing on unregulated contaminants at the treatment plant and the maximum residence time in the distribution system. The monitoring results will be utilized by the EPA to determine if these chemicals should be regulated. The unregulated contaminant monitoring that yielded results are presented in the chart below

Unregulated Contaminant Monitoring			
Regulated Contaminant	Unit of Measure	Highest Level Detected	Range of Detection
Chromium	ug/L	0.40	0 – 0.4
Hexavalent Chromium	ug/L	0.40	0.34 – 0.40
Strontium	ug/L	130	120 – 130
Vanadium	ug/L	0.20	0 – 0.20

2014 Regulated Detected Contaminants
Monitored in Distribution System

Disinfectant Residuals						
Regulated Contaminant	Unit of Measure	MCLG	MCL	Highest Level Detected	Range of Detection	Violation
Total Chlorine Residual	mg/L	4.0	4.0	3.5	0.1 – 3.5	No

Microbiological Contaminants				
Regulated Contaminant	MCL G	MCL	Highest Number detected (in 1 month)	Violation
Total Coliform bacteria	0	The presence of coliform bacteria in > 5% of monthly samples	15	Yes
E. coli Bacteria	0	0	1	Yes

Disinfectant residuals and microbiological contaminants are monitored at 8 locations throughout the city distribution system, and at the 2 drinking water reservoirs and pump stations located out in the distribution system. At least 100 samples are collected and analyzed each month.

Lead & Copper						
Regulated Contaminant	Unit of Measure	MCLG	Action Level AL	90th Percentile Value	Number of samples over AL	Violation
Lead	ug/L	0	15	6	2	No
Copper	mg/L	1.3	1.3	0.11	0	No

Lead and copper monitoring was conducted from June through December 2014 with the collection of 100 samples. Samples were collected by residents from the taps at their residence. Thank you to all who participated in collecting samples.

Disinfection By-Products						
Regulated Contaminant	Unit of Measure	MCL G	MCL	Highest Level Detected	Range of Detection	Violation
Total Trihalomethanes (TTHM)	ug/L	n/a	80	196	33.3 -196.2	Yes
Haloacetic Acids (HAA)	ug/L	n/a	60	64	5 - 64	No
Bromate	ug/L	10	10	23	0 - 23	No

Disinfection by-products occur as a result of the water treatment process. Bromate is formed as a result of using ozone as a treatment additive. Ozone is used to help control taste and odor issues, and as a pre-treatment disinfection. Naturally occurring bromide reacts with Ozone to generate bromate. Bromate is monitored monthly, and compliance is based on a yearly average.

TTHM's and HAA's are formed as a result of utilizing chlorine in the treatment process. Naturally occurring compounds known as TOC's (total organic carbon) react with chlorine to form TTHM's and HAA's. The temperature and the age of water increase the formation of THM's and HAA's, and as a result, during the warm months of the year is when levels were at their highest. Samples are tested quarterly from 8 sites throughout the distribution system and compliance is based on a running annual average at each individual site.

Key to the Detected Contaminant Tables		
Symbol	**Abbreviation for**	**Definition/Explanation**
>	Greater than	
AL	Action Level	The concentration of a contaminant, which, if exceeded, triggers treatment or other requirements which a water system must follow.
HAA5	Haloacetic Acids	HAA5 is the total of bromoacetic, chloroacetic, dibromoacetic, dichoroacetic, and trichloroacetic acids. Compliance is based on the total .
LRAA	Locational Running Annual Average	
MCL	Maximum Contaminant Level	The highest level of a contaminant that is allowed in d water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
MCLG	Maximum Contaminant Level Goal	The level of contaminant in drinking water below which there is no known or expected risk to health.
mg/L	Milligrams per Liter	A milligram = 1/1000 gram 1 milligram per liter is equal to 1ppm
MRDL	Maximum Residual Disinfectant Level	The highest level of disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
MRDLG	Maximum Residual Disinfectant Level Goal	The level of a drinking water disinfectant below which there is no known or expected risk to health. MRLDG's do not reflect the benefits of the use of disinfectants to control microbial contaminants.
n/a	Not Applicable	
ND	Not Detected	
NTU	Nephelometric Turbidity Units	Measures the cloudiness of water.
pCi/L	Picocuries per Liter	A measure of radioactivity. Picocurie (pCi) means the quantity of radioactive material producing 2.22 nuclear transformations per minute.
ppb	Parts Per Billion (one in one billion)	The ppb is equivalent to micrograms per liter. A microgram = 1/1000 milligram.
ppm	Parts Per Million (one in one million)	The ppm is equivalent to milligrams per liter. A milligram = 1/1000 gram.
RAA	Running Annual Average	
TT	Treatment Technique	A required process intended to reduce the level of a contaminant in drinking water.
TTHM	Total Trihalomethanes	Total Trihalomethanes is the sum of chloroform, bromodichloromethane, dibromoochloromethane and bromoform. Compliance is based on total.
ug/L	Micrograms per Liter	A microgram = 1/1,000,000 gram 1 microgram per liter is equal to 1ppb

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Department of Utilities

FLINT WATER PLANT

City of Flint
Water Plant & Facilities

2014 Consumers Annual Report on Water Quality

The City of Flint Department of Utilities is dedicated to providing high quality drinking water to the residents of the community. The Consumers Annual Report on Water Quality provides important information about your drinking water. This report includes information about the source of the water, health information, a chart summarizing United States Environmental Protection Agency (USEPA) required testing results, and a table giving explanations of important terms to understand when viewing the test results. The Flint Water Plant & Facilities operates and maintains a certified drinking water laboratory to assure compliance with all state and federal regulations and is committed to prompt and thorough notification to the consumers if there is any reason for concern about the quality of the drinking water.

Information about your drinking water is available at the City of Flint web page on the Internet at www.cityofflint.com or by calling the Flint Water Plant & Facilities at (810) 787-6537. The Safe Drinking Water Hotline at (800) 426-4791 is a resource for health related questions and water quality issues. General drinking water information can be found on the USEPA web site at www.epa.gov/safewater/.

Water Source

From January 1st through April 30th 2014, The City of Flint purchased drinking water from the Detroit Water & Sewerage Department (DWSD) which operates several drinking water facilities. Following treatment to remove impurities, the water is pumped by DWSD to the Flint Water Plant, where the water is then monitored and distributed throughout the City.

The source water comes from the lower Lake Huron watershed. The watershed includes numerous short, seasonal streams that drain to Lake Huron. The Michigan Department of Environmental Quality in partnership with the U.S. Geological Survey, the Detroit Water & Sewerage Department, and the Michigan Public Health Institute performed a source water assessment in 2004 to determine the susceptibility of potential contamination. The susceptibility rating is a seven-tiered scale ranging from "very low" to "very high" based primarily on geologic sensitivity, water chemistry, and contaminant sources. The Lake Huron source water intake is categorized as having a moderately low susceptibility to potential contaminant sources. The Lake Huron water treatment plant has historically provided satisfactory treatment of this source water to meet drinking water standards. If you would like to know more information or a complete copy of the report, contact the City of Flint Water Plant at (810) 787-6537.

General Information

In order to ensure that tap water is safe to drink, the EPA prescribes regulations, which limit the amount of certain contaminants in water provided by the public water systems. The Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water, which must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791).

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Lake Huron Water Treatment Plant

2014 Regulated Detected Contaminants Tables

Regulated Contaminant	Test Date	Unit	Health Goal MCLG	Allowed Level MCL	Highest Level Detected	Range of Detection	Violation yes/no	Major Sources in Drinking Water
Inorganic Chemicals – Monitoring at the Plant Finished Water Tap								
Fluoride	5/13/14	ppm	4	4	0.59	n/a	No	Erosion of natural deposits; Water additive, which promotes strong teeth; Discharge from fertilizer and aluminum factories.
Nitrate	5/13/14	ppm	10	10	0.31	n/a	No	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.
Disinfection By-Products – Monitoring in Distribution System Stage 2 Disinfection By-Products								
Regulated Contaminant	**Test Date**	**Unit**	**Health Goal MCLG**	**Allowed Level MCL**	**Highest LRAA**	**Range of Detection**	**Violation yes/no**	**Major Sources in Drinking Water**
Total Trihalomethanes (TTHM)	2014	ppb	n/a	80	33.0	10.0 - 48.5	No	By-product of drinking water chlorination
Haloacetic Acids (HAA5)	2014	ppb	n/a	60	15.8	8.0 – 19.0	No	By-product of drinking water disinfection
Disinfectant Residuals Monitoring in DWSD Distribution System								
Regulated Contaminant	**Test Date**	**Unit**	**Health Goal MRDGL**	**Allowed Level MRDL**	**Highest RAA**	**Range of Detection**	**Violation yes/no**	**Major Sources in Drinking Water**
Total Chlorine Residual	Jan-Dec 2014	ppm	4	4	0.82	0.64-0.94	No	Water additive used to control microbes
Regulated Contaminant	**Treatment Technique**							**Typical Source of Contaminant**
Total Organic Carbon (ppm)	The Total Organic Carbon (TOC) removal ratio is calculated as the ratio between the actual TOC removal and the TOC removal requirements. The TOC was measured each month and because the level was low, there is no requirement for TOC removal.							Erosion of natural deposits

2014 Turbidity – Monitored every 4 hours at Plant Finished Water Tap			
Highest Single Measurement Cannot exceed 1 NTU	**Lowest Monthly % of Samples Meeting Turbidity Limit of 0.3 NTU (minimum 95%)**	**Violation yes/no**	**Major Sources in Drinking Water**
0.19 NTU	100%	No	Soil Runoff
Turbidity is a measure of the cloudiness of water. We monitor it because it is a good indicator of the effectiveness of our filtration system.			

2014 Microbiological Contaminants – Monthly Monitoring in Distribution System					
Regulated Contaminant	**MCLG**	**MCL**	**Highest Number Detected**	**Violation yes/no**	**Major Sources in Drinking Water**
Total Coliform Bacteria	0	Presence of Coliform bacteria > 5% of monthly samples	0	No	Naturally present in the environment.
E.coli Bacteria	0	A routine sample and a repeat sample are total coliform positive, and one is also fecal or E. coli positive.	0	No	Human waste and animal fecal waste.

2011 Lead and Copper Monitoring at Customers' Tap								
Regulated Contaminant	**Test Date**	**Unit**	**Health Goal MCLG**	**Action Level AL**	**90th Percentile Value***	**Number of Samples Over AL**	**Violation yes/no**	**Major Sources in Drinking Water**
Lead	2011	ppb	0	15	< 2.0	0	No	Corrosion of household plumbing system; Erosion of natural deposits.
Copper	2011	ppm	1.3	1.3	0.10	0	No	Corrosion of household plumbing system; Erosion of natural deposits; Leaching from wood preservatives.

*The 90th percentile value means 90 percent of the homes tested have lead and copper levels below the given 90th percentile value. If the 90th percentile value is above the AL additional requirements must be met.

2014 Radionuclides							
Regulated Contaminant	**Test Date**	**Unit**	**Health Goal MCLG**	**Allowed Level MCL**	**Level Detected**	**Violation yes/no**	**Major Sources in Drinking Water**
Combined Radium Radium 226 & 228	5/13/14	pCi/L	0	5	0.86 + or - 0.55	No	Erosion of natural deposits

2014 Special Monitoring

Contaminant	**MCLG**	**MCL**	**Level Detected**	**Source of Contamination**
Sodium (ppm)	**n/a**	**n/a**	**4.78**	Erosion of natural deposits

Collection, sampling result information and table provided by Detroit Water and Sewerage Department (DWSD) Water Quality Division, ML Semegen
City of Flint sample result information provided by the City of Flint Water Plant, M. Glasgow.

2014 Key to the Detected Contaminant Tables		
Symbol	**Abbreviation for**	**Definition/Explanation**
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mg/L	Milligrams per Liter	A milligram = 1/1000 gram 1 milligram per liter is equal to 1ppm
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pCi/L	Picocuries per Liter	A measure of radioactivity. Picocurie (pCi) means the quantity of radioactive material producing 2.22 nuclear transformations per minute.
ppb	Parts Per Billion (one in one billion)	The ppb is equivalent to micrograms per liter. A microgram = 1/1000 milligram.
ppm	Parts Per Million (one in one million)	The ppm is equivalent to milligrams per liter. A milligram = 1/1000 gram.
RAA	Running Annual Average	
TT	Treatment Technique	A required process intended to reduce the level of a contaminant in drinking water.
TTHM	Total Trihalomethanes	Total Trihalomethanes is the sum of chloroform, bromodichloromethane, dibromoochloromethane and bromoform. Compliance is based on total.

8/4/15 w. Flint

Dave Murray – Deputy
Wayne Workman
Tom Sayton
Lory
SB
Burl W.
Jaquel Harris
Pastor Hall
Pastor Oberton
Claire Mellinton

Dennis Muchmore

*
Communications
Outreach – PCH ?
Pb education ?

Lee Kearney

Harvey H.

Dr. Suder
Melissa Mays
LeAnn Walker

* why was a 2nd sample not included in the calculation ?

Nancy Peeler (DCH)
Pb testing of children
used by Medicaid
Policy 90% of
enrolled

pH change since source changed
Nelson - her pH is 4

why do we use small water bottle?

auto structure

RTAB
transition advisory Board

- if flint were to reconnect to Detroit water it would cost $1M/month
- if flint had stayed on Detroit rates would have gone up 12%.

CUSTOMER SERVICE CENTER
CITY HALL
1101 S. SAGINAW ST.
FLINT, 48501

PRSRT STD
U.S. Postage
PAID
Flint, MI
Permit No. 512

SULLIVAN,LAURA,LINDAHL,
OR CURRENT RESIDENT
3101 HAWTHORNE DR
FLINT MI 48503-4642

T13 P1 - 5701

Department of Utilities
FLINT WATER PLANT

City of Flint
Water Plant & Facilities

2014 Consumers Annual Report on Water Quality

The City of Flint Department of Utilities is dedicated to providing high quality drinking water to the residents of the community. The Consumers Annual Report on Water Quality provides important information about your drinking water. This report includes information about the source of the water, health information, a chart summarizing United States Environmental Protection Agency (USEPA) required testing results, and a table giving explanations of important terms to understand when viewing the test results. The Flint Water Plant & Facilities operates and maintains a certified drinking water laboratory to assure compliance with all state and federal regulations and is committed to prompt and thorough notification to the consumers if there is any reason for concern about the quality of the drinking water.

Information about your drinking water is available at the City of Flint web page on the Internet at www.cityofflint.com or by calling the Flint Water Plant & Facilities at (810) 787-6537. The Safe Drinking Water Hotline at (800) 426-4791 is a resource for health related questions and water quality issues. General drinking water information can be found on the USEPA web site at www.epa.gov/safewater/.

Water Source

From January 1st through April 30th 2014, The City of Flint purchased drinking water from the Detroit Water & Sewerage Department (DWSD) which operates several drinking water facilities. Following treatment to remove impurities, the water is pumped by DWSD to the Flint Water Plant, where the water is then monitored and distributed throughout the City.

The source water comes from the lower Lake Huron watershed. The watershed includes numerous short, seasonal streams that drain to Lake Huron. The Michigan Department of Environmental Quality in partnership with the U.S. Geological Survey, the Detroit Water & Sewerage Department, and the Michigan Public Health Institute performed a source water assessment in 2004 to determine the susceptibility of potential contamination. The susceptibility rating is a seven-tiered scale ranging from "very low" to "very high" based primarily on geologic sensitivity, water chemistry, and contaminant sources. The Lake Huron source water intake is categorized as having a moderately low susceptibility to potential contaminant sources. The Lake Huron water treatment plant has historically provided satisfactory treatment of this source water to meet drinking water standards. If you would like to know more information or a complete copy of the report, contact the City of Flint Water Plant at (810) 787-6537.

General Information

In order to ensure that tap water is safe to drink, the EPA prescribes regulations, which limit the amount of certain contaminants in water provided by the public water systems. The Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water, which must provide the same protection for public health. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791).

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in source water include:

- **Microbial contaminants;** such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- **Inorganic contaminants;** such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- **Pesticides and herbicides;** which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses.
- **Organic chemical contaminants;** including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems.
- **Radioactive contaminants;** which can be naturally occurring or be the result of oil and gas production and mining activities.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-comprised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Infants and young children are typically more vulnerable to lead in drinking water than the general population. It is possible that the lead levels at your hoe may be higher than at other homes in the community as a result of materials used in your home's plumbing Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Flint Department of Utilities is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. If you are concerned about elevated lead levels in your home's water, you can minimize your potential exposure to lead in your water by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

Lake Huron Water Treatment Plant
2014 Regulated Detected Contaminants Tables

Regulated Contaminant	Test Date	Unit	Health Goal MCLG	Allowed Level MCL	Highest Level Detected	Range of Detection	Violation yes/no	Major Sources in Drinking Water
Inorganic Chemicals – Monitoring at the Plant Finished Water Tap								
Fluoride	5/13/14	ppm	4	4	0.59	n/a	No	Erosion of natural deposits; Water additive, which promotes strong teeth; Discharge from fertilizer and aluminum factories.
Nitrate	5/13/14	ppm	10	10	0.31	n/a	No	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.

Disinfection By-Products – Monitoring in Distribution System Stage 2 Disinfection By-Products								
Regulated Contaminant	**Test Date**	**Unit**	**Health Goal MCLG**	**Allowed Level MCL**	**Highest LRAA**	**Range of Detection**	**Violation yes/no**	**Major Sources in Drinking Water**
Total Trihalomethanes (TTHM)	2014	ppb	n/a	80	33.0	10.0 - 48.5	No	By-product of drinking water chlorination
Haloacetic Acids (HAA5)	2014	ppb	n/a	60	15.8	8.0 – 19.0	No	By-product of drinking water disinfection

Disinfectant Residuals Monitoring in DWSD Distribution System								
Regulated Contaminant	**Test Date**	**Unit**	**Health Goal MRDGL**	**Allowed Level MRDL**	**Highest RAA**	**Range of Detection**	**Violation yes/no**	**Major Sources in Drinking Water**
Total Chlorine Residual	Jan-Dec 2014	ppm	4	4	0.82	0.64-0.94	No	Water additive used to control microbes

Regulated Contaminant	Treatment Technique	Typical Source of Contaminant
Total Organic Carbon (ppm)	The Total Organic Carbon (TOC) removal ratio is calculated as the ratio between the actual TOC removal and the TOC removal requirements. The TOC was measured each month and because the level was low, there is no requirement for TOC removal.	Erosion of natural deposits

2014 Turbidity – Monitored every 4 hours at Plant Finished Water Tap			
Highest Single Measurement Cannot exceed 1 NTU	**Lowest Monthly % of Samples Meeting Turbidity Limit of 0.3 NTU (minimum 95%)**	**Violation yes/no**	**Major Sources in Drinking Water**
0.19 NTU	100%	No	Soil Runoff
Turbidity is a measure of the cloudiness of water. We monitor it because it is a good indicator of the effectiveness of our filtration system.			

2014 Microbiological Contaminants – Monthly Monitoring in Distribution System					
Regulated Contaminant	**MCLG**	**MCL**	**Highest Number Detected**	**Violation yes/no**	**Major Sources in Drinking Water**
Total Coliform Bacteria	0	Presence of Coliform bacteria > 5% of monthly samples	0	No	Naturally present in the environment.
E.coli Bacteria	0	A routine sample and a repeat sample are total coliform positive, and one is also fecal or E. coli positive.	0	No	Human waste and animal fecal waste.

2011 Lead and Copper Monitoring at Customers' Tap								
Regulated Contaminant	**Test Date**	**Unit**	**Health Goal MCLG**	**Action Level AL**	**90th Percentile Value***	**Number of Samples Over AL**	**Violation yes/no**	**Major Sources in Drinking Water**
Lead	2011	ppb	0	15	< 2.0	0	No	Corrosion of household plumbing system; Erosion of natural deposits.
Copper	2011	ppm	1.3	1.3	0.10	0	No	Corrosion of household plumbing system; Erosion of natural deposits; Leaching from wood preservatives.

*The 90th percentile value means 90 percent of the homes tested have lead and copper levels below the given 90th percentile value. If the 90th percentile value is above the AL additional requirements must be met.

2014 Radionuclides							
Regulated Contaminant	**Test Date**	**Unit**	**Health Goal MCLG**	**Allowed Level MCL**	**Level Detected**	**Violation yes/no**	**Major Sources in Drinking Water**
Combined Radium Radium 226 & 228	5/13/14	pCi/L	0	5	0.86 + or - 0.55	No	Erosion of natural deposits

2014 Special Monitoring

Contaminant	MCLG	MCL	Level Detected	Source of Contamination
Sodium (ppm)	**n/a**	**n/a**	**4.78**	Erosion of natural deposits

Collection, sampling result information and table provided by Detroit Water and Sewerage Department (DWSD) Water Quality Division, ML Semegen
City of Flint sample result information provided by the City of Flint Water Plant, M. Glasgow.

2014 Key to the Detected Contaminant Tables		
Symbol	**Abbreviation for**	**Definition/Explanation**
>	Greater than	
AL	Action Level	The concentration of a contaminant, which, if exceeded, triggers treatment or other requirements which a water system must follow.
HAA5	Haloacetic Acids	HAA5 is the total of bromoacetic, chloroacetic, dibromoacetic, dichoroacetic, and trichloroacetic acids. Compliance is based on the total .
LRAA	Locational Running Annual Average	
MCL	Maximum Contaminant Level	The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
MCLG	Maximum Contaminant Level Goal	The level of contaminant in drinking water below which there is no known or expected risk to health.
mg/L	Milligrams per Liter	A milligram = 1/1000 gram 1 milligram per liter is equal to 1ppm
MRDL	Maximum Residual Disinfectant Level	The highest level of disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
MRDLG	Maximum Residual Disinfectant Level Goal	The level of a drinking water disinfectant below which there is no known or expected risk to health. MRLDG's do not reflect the benefits of the use of disinfectants to control microbial contaminants.
n/a	Not Applicable	
ND	Not Detected	
NTU	Nephelometric Turbidity Units	Measures the cloudiness of water.
pCi/L	Picocuries per Liter	A measure of radioactivity. Picocurie (pCi) means the quantity of radioactive material producing 2.22 nuclear transformations per minute.
ppb	Parts Per Billion (one in one billion)	The ppb is equivalent to micrograms per liter. A microgram = 1/1000 milligram.
ppm	Parts Per Million (one in one million)	The ppm is equivalent to milligrams per liter. A milligram = 1/1000 gram.
RAA	Running Annual Average	
TT	Treatment Technique	A required process intended to reduce the level of a contaminant in drinking water.
TTHM	Total Trihalomethanes	Total Trihalomethanes is the sum of chloroform, bromodichloromethane, dibromoochloromethane and bromoform. Compliance is based on total.

DEQ Timeline

1/28/2015 - Meeting requested by Hurley Hospital and McLaren hospital with Department of Community Health (now Dept. of Health and Human Services) and Department of Environmental Quality staff concerning Genesee County Health Department response to Legionellosis Investigations.

1/30/2015 DEQ provided DCH staff with City of Flint water system information.

3/17/2015 – DEQ call and email to the City of Flint regarding optimization strategies to help minimize the potential for outbreaks in customer plumbing systems

3/10/2015 – 3/19/2015 – Discussion with Genesee County Health Department regarding information requests Genesee County made to the City of Flint (DEQ shared with DCH on 3/12)

4/8/2015 – Conference call between DCH (DHHS) and DEQ regarding DCH case and epidemiology status update (Prysby and Shekter Smith)

4/9/2015 – 4/10/2015 – DEQ staff attended smart water summit via live stream on Legionella issues

4/14/2015 – Meeting between DCH (DHHS) and DEQ (Prysby, Busch, Philip, Shekter Smith)

4/14/2015 – DEQ call with EPA regarding EPA ORD assistance abilities for City and DCH.

4/24/2015 – DEQ emailed DCH with City of Flint water quality information from sampling and operational monitoring

4/24/2015 – DEQ notified DCH via email of meetings with hospitals scheduled for 4/29/2015

4/29/2015 – DEQ Meetings with the following regarding secondary treatment and premise plumbing
- Hurley Hospital
- McLaren Hospital
- City of Flint Cross Connection Inspection/Plumbing Inspector

5/1/2015 – DEQ emails with information regarding water safety plans and best practices to
- Hurley Hospital
- McLaren Hospital

5/1/2015 – DEQ emails to City of Flint Cross Connection Inspector / Plumbing Inspector with info on identifying customers that should consider development of a Water Safety Plan for their premise plumbing

5/5/2015 – DEQ ODWMA internal meeting to discuss how to proceed regarding secondary treatment

5/12/2015 – Response from the City of Flint with list of customers that may need a Water Safety Plan

6/52015 – 6/8/2015 – Email communications between Genesee County Health Department and DCH regarding epidemiology status update

6/15/2015 – DEQ Meeting with Dept. of Licensing and Regulatory Affairs regarding Secondary Treatment

6/19/2015 – DEQ Letter to Michigan Society for Health Care Engineering and Michigan Health and Hospital Association regarding secondary treatment

7/30/2015 – DEQ Holds Hospital/Health Care Facility Treatment of Water Received from a Public Water Supply Meeting

MDSS ID _____

Legionellosis Questionnaire
Genesee County, 2014-2015

Interviewer Identification

Date of Interview: _____ Interviewer's Name: _____
Health Dept.: _____ Phone Number: _____ E-mail: _____

What was the patient's outcome? ☐ *RECOVERED* ☐ *STILL ILL* ☐ *DIED* ☐ *UNK*

Patient Contact Information

Name: _____ Age: _____ Sex: ☐ M ☐ F
Street address: _____ City: _____
State: _____ Zip: _____ County: _____
Daytime Phone: _____ Evening Phone: _____

Surrogate Contact Information *<List surrogate contact information if patient is too unwell or has died>*

Name: _____
Daytime Phone: _____ Evening Phone: _____
Relationship to Patient: _____

Hello, my name is _____ and I'm calling from _____ (health department). We are investigating a cluster of respiratory illnesses in Genesee County. At this point, the source of these illnesses is still under investigation. We are hoping this interview will provide further information and answers about the illnesses. I'd like to ask you a few questions about your home and your exposures during the 2 weeks before you got sick. You do not have to answer any of the questions, but any assistance you can provide is appreciated. Do you have about 30 minutes to talk? If not now, when would be a good time for me to call back? _____

<If the case is from more than 1 month prior, the following text may be used: >
It might be helpful for you to collect documents such as a calendar, receipts, credit card or bank statements to jog your memory about your activities and where you were in the 2 weeks prior to getting sick. The only information we would ask you to share from these are dates and locations. Would you like me to call you back after you have time to collect these materials? When would be a convenient day and time for me to call you back? _____

I have that your first symptom started on *<insert onset date>* _____. Is this correct?

☐ Yes ☐ No ☐ Not sure

If no, what was the first date you started feeling sick? ___/___/_____

List dates of exposure period: from ___/___/___ *to* ___/___/___ *<The exposure period includes the 2 weeks before the date of illness onset>*

Illness Information

1.) During your illness, did you have any of the following symptoms?

	Check one:		
	YES	NO	UNK
Diagnosis of pneumonia			
Fever If yes, highest temp:			
Chills			
Cough			
Nausea			
Vomiting			
Diarrhea			
Aches or muscle pains			
Chest pain			
Shortness of breath			
Sore throat			
Headaches			
Other symptoms (*specify*):			

Exposure Information

2.) How long have you lived at your current residence? _____

<If they have moved since the listed exposure period, indicate that you are asking about the house they lived in prior to becoming sick>

a.) If you moved after the exposure period/illness, what was your previous residence address? _____

3.) Where did you get your tap (drinking and other household use) water from between ___/___/___ and ___/___/___ ? *<Exposure period from above>*

- ☐ 1. City of Flint Water
- ☐ 2. City of Flint Township Water
- ☐ 3. Other municipal water system
- ☐ 4. Private well
- ☐ 5. Unknown
- ☐ 6. Other _____

4.) During the last year, has the water pressure at your residence changed? ☐ Yes ☐ No ☐ Not Sure

a.) If yes, did the water pressure: ☐ Increase ☐ Decrease

b). If yes, when did the water pressure change occur? _____

5.) During the last year, has the water quality (appearance, taste, smell) at your residence changed?
☐ Yes ☐ No ☐ Not Sure
a.) If yes, please describe the change in the water quality:_____
_____
b). If yes, when did the water quality change occur? _____

6.) Prior to your illness, did you make any recent plumbing changes or repairs at your residence?
☐ Yes ☐ No ☐ Not sure
a.) If yes, please describe the changes/repairs and give the dates the work was done.
_____
_____

7.) Prior to your illness, were there any water main breaks or other water line issues that affected the water at your residence, including boil water advisories? ☐ Yes ☐ No ☐ Not sure
a.) If yes, please describe the water main/line issues or boil water advisories and give the dates they occurred.
_____
_____

I'd like to ask you some questions about what you did during the 2 weeks **before** you got sick.
The time period I'm asking about is between ___/___/___ and ___/___/___.*<Exposure period>*
During this 2 week period, did you:

8.) Work or volunteer, either full or part time? ☐ Yes ☐ No ☐ Not sure
a.) If yes, complete the following table:

Job description	Company	Location	Any exposure to misty water?

9.) Spend any time in a hospital, doctor's office, clinic, or dentist office as a patient, visitor, employee, or volunteer? ☐ Yes ☐ No ☐ Not sure
a.) If yes, check all that apply:

Exposure	Date(s)	Reason for Visit	Name & City of Hospital/ Office/ Clinic	Name of Doctor
Inpatient ☐	Admission_____ Discharge_____			
Outpatient ☐				
Visitor ☐				
Employee ☐				
Volunteer ☐				

10.) Visit, reside, or work in a long term care facility, nursing home, assisted living facility, or senior living facility? ☐Yes ☐No ☐Not sure

a.) If yes, complete the following table:

Exposure	Date(s)	Name & City of Facility
Resident ☐		
Visitor ☐		
Employee ☐		

11.) In the 2 weeks before you before you got sick (___/___/___ to ___/___/___), did you spend any nights away from home (excluding healthcare settings)? ☐Yes ☐No ☐Not sure

a.) If yes, complete the following table: *<prompts: hotel, campground, cabin, cruise, second home, with family, etc.>*

Accommodation Type/Name	Address Street, City, State	Floor/Room No.	Dates of Stay	
			Arrival	Departure

12.) In the 2 weeks before you before you got sick (___/___/___ to ___/___/___), did you visit any of the following community venues?

	Check one:					
Venue	YES	NO	UNK	Date(s)	Name of Venue	Address
Hotel (*without* staying overnight – e.g. dinner, wedding)						
Auditorium						
Barbershop or Hair salon						
Car wash						
Casino						
Church or Place of worship						
Gym or Work out facility						
Grocery store						
Home improvement store						
Spa or Nail salon						
Mall or Department store						
Movie theater						
Other (*specify*)						

13.) In the 2 weeks before you before you got sick (___/___/___ to ___/___/___), did you have exposure to any of the following water sources, either ***at home*** or while ***away from home***?

Exposures ***at home***	Check one: YES	NO	UNK	Dates (s)	Description: Name (or Type)/Location
Shower					
Use a detachable shower head or hose					
Hot tub, whirlpool spa, Jacuzzi tub					
Sat NEAR a working hot tub or whirlpool spa but did not get in					
Steam room or wet sauna					
Humidifier (whole house or portable)					If yes, specify type: If yes, what type of water is used in device? □Bottled □Tap □Other:_____
Respiratory therapy machine (e.g. nebulizer, CPAP, BiPAP, etc.)					If yes, specify type: If yes, what type of water is used in device? □Bottled □Tap □Other:_____
Other (*specify*)					

Exposures ***away from home***	YES	NO	UNK	Dates (s)	Description: Name (or Type)/Location
Shower at gym, work, other location					
Use a detachable shower head or hose					
Hot tub, whirlpool spa, Jacuzzi tub					
Sat NEAR a working hot tub or whirlpool spa but did not get in					
Humidifier (whole house or portable)					If yes, specify type: If yes, what type of water is used in device? □Bottled □Tap □Other:_____
Pool/splash pad/waterpark					
Recreational or cooling misters					
Steam room or wet sauna					
Decorative fountain					
Outdoor watering hose or sprinkler					
Beach, lake, pond, river, creek, etc.					
Other (*specify*)					

MDSS ID _____

Medical History

Now I'm going to ask a few questions about your medical history and health behaviors.

14.) Have you ever been told by a healthcare provider that you had any of the following conditions:

	Check one:			
Condition	YES	NO	UNK	Comments
Chronic kidney disease				
Weakened immune system (due to cancer, chemotherapy, radiation therapy, immunosuppressive meds, HIV, organ transplant, etc.)				
Diabetes				
Chronic lung disease (COPD, emphysema)				
Asthma or chronic bronchitis				
Heart disease or congestive heart failure				
Liver disease				
Other conditions (*specify*)				

15.) Health behaviors:

	Check one:			
	YES	NO	Quantity per day (packs or drinks)	Duration (years)
Are you currently a smoker?				
Are you a former smoker?				
Do you drink alcohol?				

16.) Do you know anyone else with similar symptoms? ☐ Yes ☐ No ☐ Not sure

a.) If yes, complete the following table:

Name	Phone	State of Residence	Details of Shared Exposure

Additional Comments _____

_____

_____

_____

_____

Thank you so much for taking the time to answer these questions. Do you have any questions that I can help answer? If you have any questions or remember any further details later, please contact the _____ (health department) at phone: _____.

Preliminary Stats on Genesee County Legionellosis Investigation,

As of April 7, 2015

Number of lab-confirmed cases of Legionnaires' Disease: 45

Number of Pontiac fever cases: 1 possible

Total number of legionellosis cases: 46

Geographic distribution:

45/46 Genesee Co (27 Flint, 6 Mt. Morris, 4 Burton, 2 Flint Twp, 1 Flushing, 1 Byron, 1 Davison, 1 Linden, 1 Otisville, 1 Vienna Twp)

1/46 Saginaw County (1 Chesaning)

Age range: 26-94 years

Average age (median): 62.2 years (63.5 years)

% Males: 50% (23/46)

Range of illness onset dates (n=45): 6/6/14-3/9/15

Number (%) of deaths: 15.2% (7/46); expect this number will increase as interviews are completed

Number (%) with other underlying comorbidities: TBD

Conference calls with Genesee County: Jan 27; Feb 10, Feb 19, Apr 7, 2015

Conference calls with hospitals: Jan 28, 2015

Date outbreak-specific survey completed and approved: 2/23/15

Number of cases interviewed: 21 completed (45.7%; 82.6% in total attempted/completed)

MDCH: 14 completed / 29 contacted (MDCH had 2 interviewers – now increased to 4)

Genesee: 7 completed / 10

Number (%) of cases hospitalized: 45/46 (97.8%). Number in ICU: 22/45 (48.8%)

Number (%) of cases hospitalized at McLaren: 18/45 (40%)

Number (%) of cases hospitalized at Hurley: 14/45 (31%)

Number (%) of cases hospitalized at Genesys: 6/45 (13.3%)

Number (%) of cases hospitalized at other hospitals outside Flint: 7/45 (15.6%)

Number (%) of cases who had been hospitalized in 2-weeks prior to onset: 20/45 (44.4%)

Number (%) of cases who had been hospitalized in 2-weeks prior to onset at McLaren: 16/45 (35.6%)

Number (%) of cases who had been hospitalized in 2-weeks prior to onset at Hurley: 2/45 (4%)

Number (%) of cases who had been hospitalized in 2-weeks prior to onset at Genesys: 0

Number (%) of cases who had been hospitalized in 2-weeks prior to onset at other hospitals: unknown

Number (%) of cases who had a short-term visit to a hospital in 2-weeks prior to onset:

Number (%) of cases who had a short-term visit to McLaren facility in 2-weeks prior to onset: 5/45 (11.1%)

Number (%) of cases who had a short-term visit to Hurley facility in 2-weeks prior to onset: 1/45 (2%)

Number (%) of cases who had a short-term visit to Genesys facility in 2-weeks prior to onset: 0

Number (%) of cases who had been hospitalized or who had a short-term visit to a hospital facility in 2-weeks prior to onset:

Number (%) of cases who had been hospitalized or who had a short-term visit to a McLaren facility in 2-weeks prior to onset: 21/45 (46.7%)

Number (%) of cases who had been hospitalized or who had a short-term visit to a Hurley facility in 2-weeks prior to onset: 3/45 (6.7%)

Number (%) of cases who had been hospitalized or who had a short-term visit to a Genesys facility in 2-weeks prior to onset: 0

Number (%) of cases who work outside the home: 8/46 (17.4%) [min of 72% at home]

Number (%) of cases who are retired: 20 (43.5%)

Number (%) of cases who are unemployed: 7/46 (15.2%)

Number (%) of cases who are disabled: 6/46 (13%)

Number (%) of cases whose occupation status is unknown: 5/46 (10%)

guidance info,
WHO
VA
} legionella specific

no value judgement re: efficacy

D-5 certified operator

recordkeeping / reporting

plan review

fee.

local plumbing permits

inventory - DOH?
indexed by owner

meeting - w/ DLARA
hospitals/nursing homes
plumbing division

Joe Malyn
Mark Lambert

Report 8: Epi-Curve Graph

Time Period: 01/01/2010 - 04/14/2015

Time Breakdown: by Month

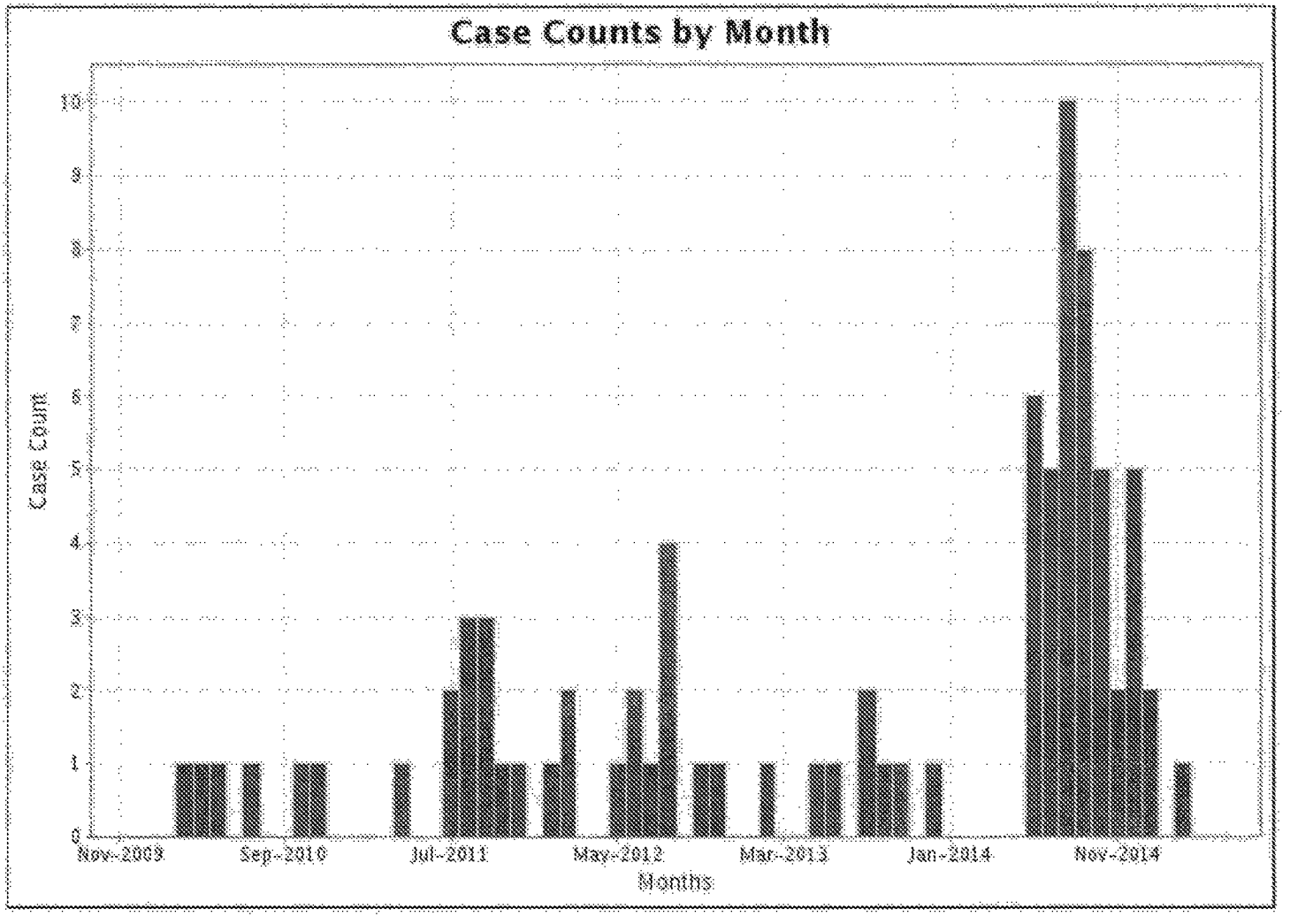
Reportable Condition: Legionellosis

Case Status: Confirmed, Probable, Suspect, Unknown

Investigation Status: Active, Completed, Completed - Follow Up, New, Review

Jurisdictions:
Genesee County

Case Types: Individual and Aggregate



Month	Total
MAR 2010	1
APR 2010	1
MAY 2010	1
JUL 2010	1
OCT 2010	1
NOV 2010	1
APR 2011	1
JUL 2011	2
AUG 2011	3
SEP 2011	3
OCT 2011	1
NOV 2011	1
JAN 2012	1
FEB 2012	2
MAY 2012	1
JUN 2012	2
JUL 2012	1
AUG 2012	4
OCT 2012	1
NOV 2012	1

Month	Total
FEB 2013	1
MAY 2013	1
JUN 2013	1
AUG 2013	2
SEP 2013	1
OCT 2013	1
DEC 2013	1
JUN 2014	6
JUL 2014	5
AUG 2014	10
SEP 2014	8
OCT 2014	5
NOV 2014	2
DEC 2014	5
JAN 2015	2
MAR 2015	1

Report 8: Epi-Curve Graph

Time Period: 01/01/2010 - 04/14/2015

Time Breakdown: by Month

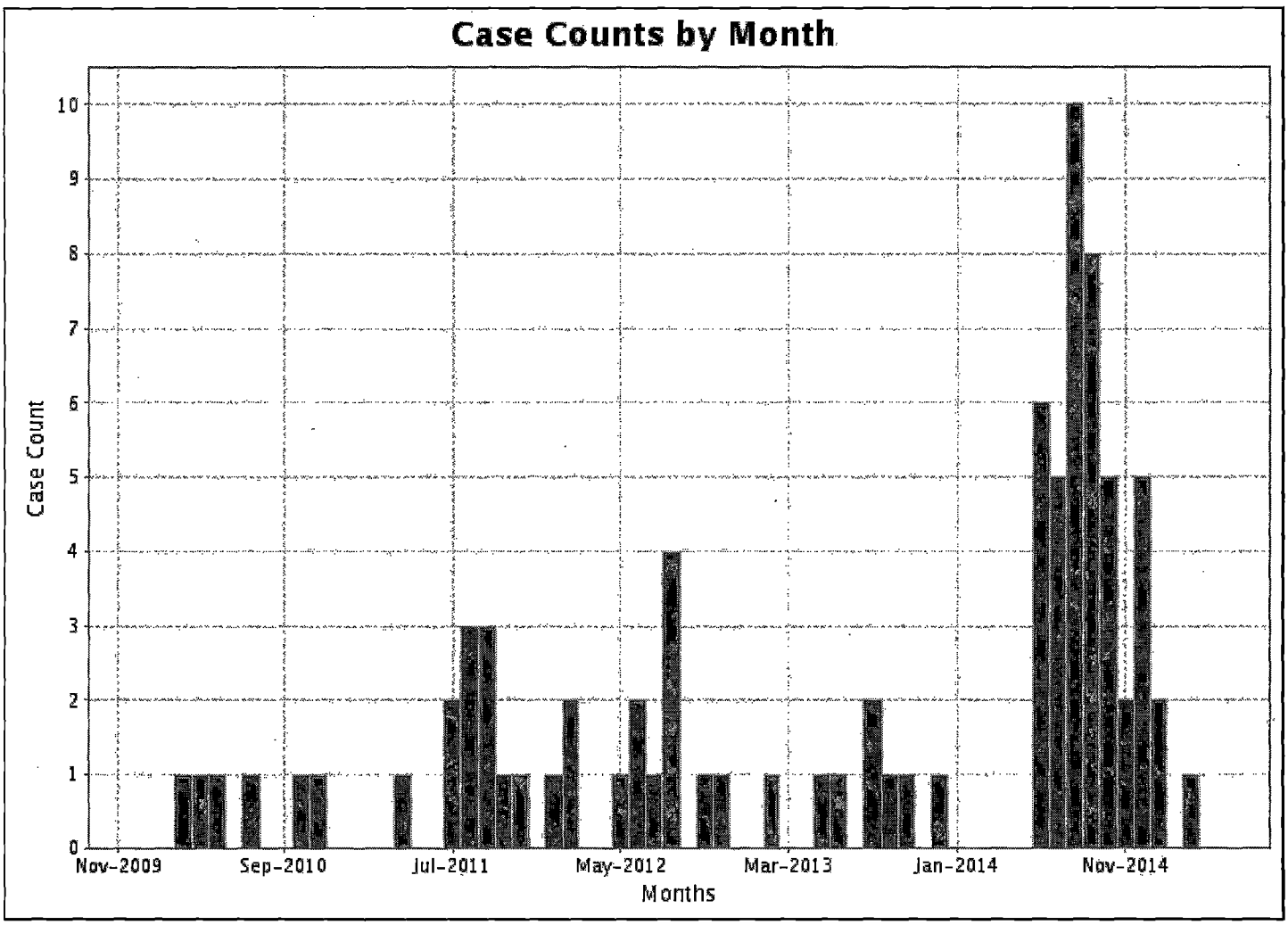
Reportable Condition: Legionellosis

Case Status: Confirmed, Probable, Suspect, Unknown

Investigation Status: Active, Completed, Completed - Follow Up, New, Review

Jurisdictions:
Genesee County

Case Types: Individual and Aggregate



Month	Total
MAR 2010	1
APR 2010	1
MAY 2010	1
JUL 2010	1
OCT 2010	1
NOV 2010	1
APR 2011	1
JUL 2011	2
AUG 2011	3
SEP 2011	3
OCT 2011	1
NOV 2011	1
JAN 2012	1
FEB 2012	2
MAY 2012	1
JUN 2012	2
JUL 2012	1
AUG 2012	4
OCT 2012	1
NOV 2012	1

Month	Total
FEB 2013	1
MAY 2013	1
JUN 2013	1
AUG 2013	2
SEP 2013	1
OCT 2013	1
DEC 2013	1
JUN 2014	6
JUL 2014	5
AUG 2014	10
SEP 2014	8
OCT 2014	5
NOV 2014	2
DEC 2014	5
JAN 2015	2
MAR 2015	1

Genesee County Health Department

Mark Valacak, M.P.H., Health Officer
Gary K. Johnson, M.D., M.P.H., Medical Director

January 27, 2015

FOIA Coordinator, City of Flint
1101 S. Saginaw Street, 3rd floor
Flint, MI 48502

RE: Flint Water Plant Information Request

Dear FOIA Coordinator,

Under provisions of the Michigan Freedom of Information Act (MCLA 15.231 et seq; MSA 4.1801 (1) et seq) please provide copies of the following:

Provide specific water testing locations and laboratory results within the City of Flint public water system for Coliform, E-coli, Heterotrophic Bacteria and Trihalomethanes from January 1, 2010 to January 27, 2015. Provide any additional water testing that has been conducted for identifying potential public health risks. Include any available mapping of the water testing areas.

Provide a map delineating the boundaries of the City of Flint water distribution system. Include any changes to the boundaries, along with corresponding dates from January 1, 2014 to January 27, 2015.

Provide a map or list of locations, detailing dead ends, pooling, low pressure and any additional areas of concern within the City of Flint water distribution system. Include any modifications to the water distribution system addressing concerns, along with corresponding dates from January 1, 2014 to January 27, 2015.

If you determine that any of the requested information is exempt from disclosure, please detail what is being withheld and cite the exemption under FOIA. I anticipate the request being filled within five working days of receipt of this letter, as provided under FOIA. Please contact me at (810) 257-3618 if there are fees associated to comply with this request.

Sincerely,

Jim Henry
Jim Henry
Environmental Health Supervisor
Genesee County Health Department
630 S. Saginaw Street
Flint, MI 48502

Shekter Smith, Liane (DEQ)

From: Pieper, Julia (DEQ)
Sent: Friday, March 28, 2014 12:42 PM
To: Krisztian, George (DEQ); Benzie, Richard (DEQ)
Cc: Dykema, Linda D. (DCH); Shekter Smith, Liane (DEQ); Lachance, Amy (DEQ); DeBruyn, Dana (DEQ)
Subject: RE: Urgent Legionaire Disease testing in Water

Importance: High

Here is the reply from DCH:
Hi Julia,

We have the capacity to look for Legionella in water, but we only perform the test when it is a part of an epidemiologic investigation. If the health department contacts our Bureau of Epidemiology and they confirm the human case and want to look for a source, we can test. They may want to contact Shannon Johnson in the Bureau of Epi. Her number is 335-9597.

James T. Rudrik, Ph.D.
Director, Infectious Disease Division
Michigan Department of Community Health
3350 N ML King Jr Blvd
Lansing, MI 48906
Phone: 517-335-9641
Fax: 517-335-9631

Julia Pieper
Drinking Water Coordinator
Organic Sub-Unit Manager
DEQ-RRD-Laboratory Services
pieperj2@michigan.gov
(517)-335-8076 phone
(517)-335-8562 fax

trade commodity division
typically in case I/p
30 cases this summer.

335-
8265
main #

Susan
Bohm
phone #? 517-373-5508

From: Krisztian, George (DEQ)
Sent: Friday, March 28, 2014 10:59 AM
To: Benzie, Richard (DEQ); Pieper, Julia (DEQ)
Cc: Dykema, Linda D. (DCH); Shekter Smith, Liane (DEQ); Lachance, Amy (DEQ); DeBruyn, Dana (DEQ)
Subject: RE: Urgent Legionaire Disease testing in Water

Hi Richard,

We do not do Legionella testing. Julie is in the process of finding out from DCH if they can do it. She will provide that information once it becomes available.

George

George L. Krisztian

Laboratory Director
Michigan Department of Environmental Quality
(517) 335-8812

From: Benzie, Richard (DEQ)
Sent: Friday, March 28, 2014 10:53 AM
To: Krisztian, George (DEQ); Pieper, Julia (DEQ)
Cc: Dykema, Linda D. (DCH); Shekter Smith, Liane (DEQ); Lachance, Amy (DEQ); DeBruyn, Dana (DEQ)
Subject: FW: Urgent Legionaire Disease testing in Water
Importance: High

George or Julia,

Are you prepared for performing analyses for legionella in water? If so, would you please answer the questions below. If not, do you know if the DCH lab is capable of doing so? Can you provide a contact. Liane suggest I copy Linda Dykema, so perhaps she can answer for community health, particularly if there are any labs in Southwest Michigan that may be relied upon if the state is unable to do so.

Richard Benzie, P.E., Acting Chief
Field Operations Section
Office of Drinking Water and Municipal Assistance, MDEQ
517-284-6512

From: Lachance, Amy (DEQ)
Sent: Friday, March 28, 2014 10:39 AM
To: Benzie, Richard (DEQ); Shekter Smith, Liane (DEQ)
Subject: FW: Urgent Legionaire Disease testing in Water
Importance: High

FYI

Amy Lachance
Grand Rapids and Kalamazoo District Supervisor
Office of Drinking Water and Municipal Assistance
Department of Environmental Quality
Cell Phone Number: 616-490-9590

From: Weaver, Cynthia (DEQ)
Sent: Friday, March 28, 2014 10:37 AM
To: Pieper, Julia (DEQ)
Cc: Lachance, Amy (DEQ); DeBruyn, Dana (DEQ)
Subject: Urgent Legionaire Disease testing in Water
Importance: High

3-28-14
Julia,
Summary at 10:05am Mick McGuire of the Van Buren Cass County District Health Dept contacted this office.

- Per Mick McGuire, Van Buren Cass County District Health Dept, there is a man who was diagnosed with Legionnaires Disease either yesterday, or today.
- It is not known which location this "man" may have worked at: Either Cass County or Berrien County.
- The VBCCDHD is investigating IF the "man" works at a previously "inactive" Type 2 public water supply in Cass County.

Preliminary Stats on Genesee County Legionellosis Investigation,

As of April 7, 2015

Number of lab-confirmed cases of Legionnaires' Disease: 45

Number of Pontiac fever cases: 1 possible

Total number of legionellosis cases: 46

Geographic distribution:

45/46 Genesee Co (27 Flint, 6 Mt. Morris, 4 Burton, 2 Flint Twp, 1 Flushing, 1 Byron, 1 Davison, 1 Linden, 1 Otisville, 1 Vienna Twp)

1/46 Saginaw County (1 Chesaning)

Age range: 26-94 years

Average age (median): 62.2 years (63.5 years)

% Males: 50% (23/46)

Range of illness onset dates (n=45): 6/6/14-3/9/15

Number (%) of deaths: 15.2% (7/46); expect this number will increase as interviews are completed

Number (%) with other underlying comorbidities: TBD

Conference calls with Genesee County: Jan 27; Feb 10, Feb 19, Apr 7, 2015

Conference calls with hospitals: Jan 28, 2015

Date outbreak-specific survey completed and approved: 2/23/15

Number of cases interviewed: 21 completed (45.7%; 82.6% in total attempted/completed)

MDCH: 14 completed / 29 contacted (MDCH had 2 interviewers – now increased to 4)

Genesee: 7 completed / 10

Number (%) of cases hospitalized: 45/46 (97.8%). Number in ICU: 22/45 (48.8%)

Number (%) of cases hospitalized at McLaren: 18/45 (40%)

Number (%) of cases hospitalized at Hurley: 14/45 (31%)

Number (%) of cases hospitalized at Genesys: 6/45 (13.3%)

Number (%) of cases hospitalized at other hospitals outside Flint: 7/45 (15.6%)

Number (%) of cases who had been hospitalized in 2-weeks prior to onset: 20/45 (44.4%)

Number (%) of cases who had been hospitalized in 2-weeks prior to onset at McLaren: 16/45 (35.6%)

Number (%) of cases who had been hospitalized in 2-weeks prior to onset at Hurley: 2/45 (4%)

Number (%) of cases who had been hospitalized in 2-weeks prior to onset at Genesys: 0

Number (%) of cases who had been hospitalized in 2-weeks prior to onset at other hospitals: unknown

Number (%) of cases who had a short-term visit to a hospital in 2-weeks prior to onset:

Number (%) of cases who had a short-term visit to McLaren facility in 2-weeks prior to onset: 5/45 (11.1%)

Number (%) of cases who had a short-term visit to Hurley facility in 2-weeks prior to onset: 1/45 (2%)

Number (%) of cases who had a short-term visit to Genesys facility in 2-weeks prior to onset: 0

Number (%) of cases who had been hospitalized or who had a short-term visit to a hospital facility in 2-weeks prior to onset:

Number (%) of cases who had been hospitalized or who had a short-term visit to a McLaren facility in 2-weeks prior to onset: 21/45 (46.7%)

Number (%) of cases who had been hospitalized or who had a short-term visit to a Hurley facility in 2-weeks prior to onset: 3/45 (6.7%)

Number (%) of cases who had been hospitalized or who had a short-term visit to a Genesys facility in 2-weeks prior to onset: 0

Number (%) of cases who work outside the home: 8/46 (17.4%) [min of 72% at home]

Number (%) of cases who are retired: 20 (43.5%)

Number (%) of cases who are unemployed: 7/46 (15.2%)

Number (%) of cases who are disabled: 6/46 (13%)

Number (%) of cases whose occupation status is unknown: 5/46 (10%)

Department of Utilities

FLINT WATER PLANT

Memorandum

To: Water Plant Personnel

From: Mike Glasgow
Utilities Administrator

Date: October, 22 2015

Subject: **Laboratory testing requirements for current water supply**

Due to the recent change in water supply, the drinking water testing for the water plant laboratory personnel has been adjusted. The testing has been arranged to reflect what was conducted in years prior to operation of the treatment plant from the river. There are a few additional items that have been included, and this schedule may be adjusted as necessary.

AM & PM PLANT RUN:

- Collect & analyze samples for chlorine residual and Coliform Bacteria in the morning and afternoon (at least 4 hours apart) from the following sites on plant grounds:
  Control Station # 2, Dort Well, Pump Station # 4, & Lab Tap

LAB TAP TESTING:

- Collect & analyze lab tap samples once daily for pH, fluoride, total hardness, alkalinity, non-carbonate hardness, calcium, magnesium, total phosphate, temperature and chloride.
- Collect & analyze 3 samples daily (at least 3 hours apart) for Turbidity.
- Collect & analyze 1 sample weekly for Heterotrophic bacteria.

DISTRIBUTION SAMPLING:

- Collect & analyze samples from the 10 distribution sites at least twice weekly for chlorine residual and coliform bacteria. A total of at 100 samples must be collected and analyzed each month, so in total, at least 10 sampling events should take place each month.
- Once weekly also test each distribution site for fluoride, total phosphate, and Heterotrophic bacteria.
- Once quarterly perform Water Quality Parameters (WQM) from the 25 distribution sites. Total phosphate will be a new addition to all the other parameters tested.
- Once quarterly collect Disinfection Byproduct samples (DBP) from 8 sites according to the current DBP schedule. Next sampling will take place the 3rd full week of November.
- Lead & copper sampling will be on going throughout the rest of the year, a detailed plan will be completed soon.

RIVER SAMPLING:

- When time permits, a river sample should be collected once weekly and analyzed for coliform bacteria, pH, fluoride, total hardness, alkalinity, non-carbonate hardness, calcium, magnesium, temperature, turbidity, and chloride.

Flint Water Plant & Facilities 4500 N. Dort Hwy. Flint, MI 48505 Phone: (810) 787-6537 Fax (810) 787-3710

City of Flint, Michigan
Office of the City Administrator

Memo

To: Dayne Walling, Mayor

From: Natasha L. Henderson, City Administrator

cc: President Freeman and Councilmembers

Date: October 20, 2015

Re: Water Filtration Plant and Water Distribution Internal Review

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Water Filtration Plant and Water Distribution Systems Overview

The City of Flint's water filtration plant and distribution system have experienced many challenges over the past two years and it is of grave concern that we reflect upon the decisions that have been made and understand how we will proceed in the future. First, and foremost the City will conduct an internal review of the steps that were taken in 2013 when the agreement with Karegnondi Water Authority (KWA) was signed.

In the wake of recent water concerns, I have developed a proactive and comprehensive plan showing the City's commitment to deliver high quality water, address its aging infrastructure, and maintain a qualified staff. I am outlining a series of steps that the city will take to not only ensure that these goals are met but a plan that is designed to start rebuilding community trust through action and transparency.

In addition, with the assistance of the EPA Task Force, Michigan Department of Environmental Quality, and Safe Drinking Water Technical Advisory Committee, the following steps are meant to go into effect as quickly as possible with all goals being accomplished by the time KWA begins delivering raw water.

- Independent review
- Processes & Testing
- Training

- Technology
- Communication
- Lead Lines
- Capital Improvements

Independent Review

We will seek to commission an independent source to review the technical and operational steps that occurred from the time the City signed on to the KWA to present. This is meant to internally perform an after action review in order to clearly assess the decisions that were made. My expectation is that we will hire out-side legal counsel to lead this internal review. I believe it is imperative that the City has all information that has led the City to the water quality issues that have arisen.

Internal Processes & Testing

We understand that EPA standards are the minimum requirements that utility systems are required to meet, the City will establish and move forward with higher standards and goals than those set by regulators. As these new standards are set, they will be published with a plan on how to obtain each goal complete with expected timeframes. The following are the first set of goals that have been set by the City that exceed the regulatory requirements.

Regulatory Requirements	City Goals
(1) F-1 Licenced Personnel	(2) F-1 Licenced Personnel
(1) S-1 Licensed Personnel	(2) S-1 Licensed Personnel
100 TTHM Samples per Month	120 TTHM Samples per Month
100 Lead/Copper Volunteer Samples / yr.	300 Lead/Copper Volunteer Samples / yr.
Annual Water Quality Report	Quarterly Water Report

Training

We will encourage all utility employees to become members of the American Water Works Association (AWWA) which is the largest nonprofit, scientific and educational association dedicated to managing and treating water. The AWWA offers continual training opportunities and the City will develop an internal training regimen that employees must adhere to. The goal is to continue to develop each employee which promotes a long term succession plan.

Technology

The addition of enhanced Supervisory Control and Data Acquisition (SCADA) will make sure that the system is running with the industries most updated technology and running as efficient as possible. The SCADA adds automation to the Water Plant thereby reducing the need for as much manual intervention. The City will also maintain Safe Drinking Water Technical Advisory Committee with more consistent meetings.

Enhanced Communication

We recognize that one of the key features of a Utility is the public communication with honest and candid information. We will increase the way we send information to people and the frequency that our communication is available. The following are first steps in that direction.

- Monitors around City Hall that display information about the water system

- Direct emails to individuals and neighborhood groups informing people where work is occurring
- Door hangers for field workers to distribute alerting people when water may be off or discolored
- A website page and GIS map dedicated to water events
- Quarterly Water reports that are directly mailed to users
- More frequent press releases that provide information relating to infrastructure concerns
- Immediate notification using all of the above media if a violation occurs
- An answering service so that every call is answered in a timely manor

Lead Service Lines

Every effort will be made to ensure a program will is in place to address the long-term goal of replacing all lead service lines. The program is expected to address the location of all City owned lead service lines and look to provide an opportunity for homeowners to receive a grant in order to have their service line changed at the same time as the city is changing its lines. This coordinated program will look to utilize funds from multiple avenues to support City residents, such as:

- CDBG Funds
- DWRF revolving loan funding
- Grant funding

Capital Improvement Plan

The City will continue to modify its 5-year CIP annually to make sure that we are always addressing the most critical issues facing the City. Another rate study will help set the correct rate for the system and determine the proper allocation to address concerns. The Water Reliability Study will continue to highlight the critical needs and will continue to be updated every two years.

As City Administrator, my goal is to ensure all of the necessary steps are in place prior to the implementation of KWA delivering water to the City. All of these initiatives will be inserted into the Utilities strategic plan and tracked regularly by staff, myself, and reported to the DPW Committee to ensure accountability.

RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

DAN WYANT
DIRECTOR

March 5, 2015

Mr. Brent Wright, Operations Supervisor
City Of Flint - DPW
Flint Water Plant
4500 North Dort Highway
Flint, Michigan 48505

WSSN: 02310

Dear Mr. Wright:

SUBJECT: Violation Notice (VN) – Maximum Contaminant Level for Total Trihalomethanes (TTHM)
Operational Evaluation – Total Trihalomethanes
1st Quarter 2015 Monitoring Period

The Department of Environmental Quality (DEQ), Office of Drinking Water and Municipal Assistance (ODWMA), records show that the city of Flint (City) is in violation of the Safe Drinking Water Act, 1976 PA 399, as amended (Act 399); R 325.10610, *Maximum contaminant levels for disinfection byproducts (MCLs)*, of the 1979 Administrative Code.

In accordance with R 325.10610, *MCL*s, of the 1979 Administrative Code, the MCL for disinfection byproduct TTHM is 0.080 milligrams per liter (mg/L) as a Locational Running Annual Average (LRAA) at each monitoring location. As listed in the table below, our records show that the City's highest TTHM locational running annual average (LRAA), based on the last four quarters, ending February 28, 2015, is 0.105 mg/L which exceeds the standard, and that two of the eight sample site locations exceed the standard of 0.080 mg/L.

Further, in accordance with R 325.10719l, *Disinfection byproducts: operational evaluation levels*, of the 1979 Administrative Code, when an operational evaluation level (OEL) at a monitoring location for TTHM exceeds 0.080 mg/L, a supply shall conduct an operational evaluation and submit a written report of the evaluation to the DEQ not later than 90 days after being notified of the analytical result that causes the supply to exceed the operational evaluation level. As listed in the table below, our records show that the TTHM OELs for the City exceed 0.080 mg/L at one of the City's eight sample site locations.

TTHM Results (mg/L)						
	5/21/14	8/21/14	11/20/14	2/17/15	LRAA	OEL
DBP1 McDonalds 3719 Davison	**0.162**	**0.145**	0.059	0.0162	**0.096**	0.059
DBP2 Liquor Palace 3302 S. Dort Highway	**0.112**	**0.127**	0.033	0.0168	0.072	0.049
DBP3 North Flint Auto 6204 N. Saginaw St.	**0.097**	**0.118**	0.041	0.0149	0.068	0.047
DBP4 University Market 2501 Flushing Road	**0.106**	**0.196**	**0.094**	0.0245	**0.105**	**0.085**
DBP5 Taco Bell 3606 Corunna Road	0.079	**0.181**	0.034	0.0151	0.078	0.063
DBP6 Rite-Aid Pharmacy 5018 Clio Road	**0.088**	**0.144**	0.054	0.0192	0.076	0.059
DBP7 Salem Housing 3216 MLK Boulevard	**0.082**	**0.112**	0.050	0.0285	0.068	0.055
DBP8 BP Gas Station 822 S. Dort Highway	0.075	**0.112**	0.036	0.0199	0.061	0.047

Our investigation consisted of a review of ODWMA files for laboratory reports received for compliance monitoring. Our investigation is considered complete. This violation began on March 1, 2015, and will continue until TTHM LRAA is below the MCL at all sample sites.

We are encouraged by the results from the most recent round of compliance samples collected on February 17, 2015, which now show individual TTHM levels at less than half of the 0.080 mg/L standard at all locations throughout the City's system. Operational Evaluation Reports from December 2014, and February 2015, have identified possible causes and corrective measures for the previous elevated TTHM levels which we encourage the City to continue implementing. These modifications have likely contributed in part to the reduction in TTHM levels reported in the most recent quarter, and suggest the City may be able to achieve compliance with the TTHM standard at all sites by continuing these efforts.

Our office is currently reviewing the Operational Evaluation Report dated February 27, 2015, and will provide the City and their consultant with comments, as needed, to help address this MCL violation.

Water systems that exceed the OEL must complete and submit an Operational Evaluation in accordance with Administrative Rule 719l (R 325.10719l) within 90 days of being notified of the violation. **An updated Operational Evaluation report, which incorporates the most recent sample results, must now be completed and received by our office by no later than Friday, May 29, 2015.**

If you have any other factual information you would like us to consider regarding the violation identified in this VN, please provide them in a written response by March 19, 2015.

Administrative rule R 325.10403 of Act 399 requires that suppliers provide public notice (PN) as soon as practical, but no later than thirty (30) days after the supplier learns of this type of violation, by mail or direct delivery **and** by any other means reasonably calculated to reach customers not normally reached by mail. Enclosed is a sample PN which contains the minimum required language. The City is encouraged to include additional information regarding its response efforts to this violation. **Please notify your consumers by April 1, 2015, and send us a signed and dated copy of the notice that you issued within ten (10) days of distributing the public notice**. This violation must also be included in your 2015 Consumer Confidence Report, due by July 1, 2016. The PN must be repeated every quarter until you no longer exceed the TTHM standard. Failure to issue a PN for this violation will result in a fine of at least $1,000 per event, with a maximum of $5,000 per violation.

We anticipate and appreciate your continued cooperation in resolving this matter. If you have any questions regarding this VN, please contact us at the numbers below; at prysbym@michigan.gov; or rosenthala@michigan.gov; or at DEQ, P.O. Box 30242, Lansing, Michigan 48909-7742.

Sincerely,

Michael F. Prysby, P.E., District Engineer
Lansing District Office
Office of Drinking Water and Municipal Assistance
517-290-8817

Adam Rosenthal, Environmental Quality Analyst
Lansing District Office
Office of Drinking Water and Municipal Assistance
517-284-6644

Enclosure

cc: Ms. Jennifer Crooks, U.S. Environmental Protection Agency, Region 5
Mr. Jerry Ambrose, Emergency Manager, City of Flint
Mr. Robert Bincsik, City of Flint
Mr. Howard Croft, City of Flint
Mr. Daughtry Johnson, City of Flint
Genesee County Health Department
Ms. Liane Shekter Smith, DEQ
Mr. Richard Benzie, DEQ
Mr. Stephen Busch, DEQ

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

City of Flint Did Not Meet Treatment Requirements

Our water system recently violated a drinking water standard. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we are doing to correct this situation.

We routinely monitor for the presence of drinking water contaminants. Samples were collected for total trihalomethanes (TTHM) analysis from eight locations on a quarterly basis (May 21, August 21, November 20 of 2014, and February 17, 2015). The average of the results at **ANY** of the eight locations must not exceed the maximum contaminant level (MCL) for TTHMs, otherwise our water system exceeds the MCL. The standard for TTHMs is 80 micro grams per liter (µg/L). The location reporting the highest TTHM level was 105 ug/L; thus, our water system exceeds the TTHM MCL.

What should I do?

- There is nothing you need to do unless you have a severely compromised immune system, have an infant, or are elderly. These people may be at increased risk and should seek advice about drinking water from their health care providers.
- You do not need to boil your water or take other corrective actions. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours.

What does this mean?

This is not an emergency. If it had been an emergency, you would have been notified within 24 hours.

People who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.

What is being done?

We are currently working on solutions to correct the problem. We anticipate resolving the problem in 2015. Our most recent individual sample results were all less than half the 80 µg/L standard, however since compliance is calculated using a locational running annual average (LRAA) of the most recent four quarters, we are still out of compliance with the MCL at two of eight locations.

For more information, please contact Mr. Brent Wright at 517-787-6537, or the Flint Water Plant at 4500 North Dort Highway, Flint, Michigan 48505.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by the City of Flint.

CERTIFICATION: WSSN: 02310

I certify that this water supply has fully complied with the public notification requirements in the Michigan Safe Drinking Water Act, 1976 PA 399, as amended, and the administrative rules.

Signature	Title	Date Distributed

Reminder to water supplier: This notice/certification must be sent to the Department of Environmental Quality.

Instructions for Stage 2 DBPR TTHM or HAA5 MCL Violation Notice – Template 2-19

Template on Reverse

If your system's locational running annual average for Total Trihalomethanes (TTHM) exceeds the MCL of 0.080 mg/L or the locational running annual average for Haloacetic Acid 5 (HAA5) exceeds the MCL of 0.060 mg/L at one or more sampling locations, you must provide public notice to persons served as soon as practical but within 30 days after you learn of the violation [40 CFR 141.203(b)]. You must issue a repeat notice every three months for as long as the violation persists.

Community systems must use one of the following methods [40 CFR 141.203(c)]:

- Hand or direct delivery
- Mail, as a separate notice or included with the bill

Noncommunity systems must use one of the following methods [40 CFR 141.203(c)]:

- Posting in conspicuous locations
- Hand delivery
- Mail

In addition, both community and noncommunity systems must use *another* method reasonably calculated to reach others if they would not be reached by the first method [40 CFR 141.203(c)]. Such methods could include newspapers, e-mail, or delivery to community organizations. If you mail, post, or hand deliver, print your notice on your system's letterhead, if available.

The notice on the reverse is appropriate for mailing, posting, or hand delivery. If you modify this notice, you must still include all required PN elements from 40 CFR 141.205(a) and leave the mandatory language unchanged (see below).

Mandatory Language

Mandatory language on health effects (from Appendix B to Subpart Q) must be included as written (with blanks filled in) and is presented in this notice in italics and with an asterisk on either end.

You must also include standard language to encourage the distribution of the public notice to all persons served, where applicable [40 CFR 141.205(d)]. This language is also presented in this notice in italics and with an asterisk on either end.

Corrective Action

In your notice, describe corrective actions you are taking. Listed below is one step commonly taken by water systems with TTHM or HAA5 MCL violations. You can include the following statement, if appropriate, or develop your own text:

- We are working to minimize the formation of [TTHM or HAA5] while ensuring we maintain an adequate level of disinfectant. We have taken additional steps to change disinfectant type/levels, remove natural organic matter, and increased flushing of water lines to determine if our efforts have been effective.

Repeat Notices

For repeat notices, you should state how long the violation has been ongoing and remind consumers of when you sent out any previous notices. If you are making progress, describe it. Alternatively, if funding or other issues are delaying progress, let consumers know.

After Issuing the Notice

Make sure to send your primacy agency a copy of each type of notice and a certification that you have met the public notice requirements within ten days after you issued the notice [40 CFR 141.31(d)].

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

[Contaminant, i.e., Total Trihalomethanes (TTHM) or Haloacetic Acid 5 (HAA5)] MCL Violation at [System]

Our water system recently violated a drinking water standard. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did (are doing) to correct this situation.

We routinely monitor for the presence of drinking water contaminants. Testing results from [provide date range] show that our system exceeds the standard, or maximum contaminant level (MCL), for [TTHM/HAA5]. The standard for [TTHM/HAA5] is [MCL]. It is determined by averaging all the samples collected at each sampling location for the past 12 months. The level of [TTHM/HAA5] averaged at one of our system's locations for [provide date range] was [level].

What should I do?

- There is nothing you need to do. You do not need to boil your water or take other corrective actions. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours.
- If you have a severely compromised immune system, have an infant, are pregnant, or are elderly, you may be at increased risk and should seek advice from your health care providers about drinking this water.

What does this mean?

This is not an emergency. If it had been an emergency, you would have been notified within 24 hours.
[TTHM are four volatile organic chemicals] [HAA5 are five haloacetic acid compounds] which form when disinfectants react with natural organic matter in the water.

[**People who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.**] Or

[**People who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.**]

What is being done?

[Describe corrective action.] We anticipate resolving the problem within [estimated time frame] (or the problem was resolved on [give date]).

For more information, please contact [name of contact] at [phone number] or [mailing address].

> **Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.***

This notice is being sent to you by [system]. State Water System ID#: _____.
Date distributed: _____.

GENESEE COUNTY DRAIN COMMISSIONER'S OFFICE
- DIVISION OF -
WATER & WASTE SERVICES
G-4610 BEECHER ROAD - FLINT, MICHIGAN 48532-2617
PHONE (810) 732-7870 - FAX (810) 732-9773

JEFFREY WRIGHT
COMMISSIONER

December 23, 2014

Orig. Lane Sprite
sent DWSD

Sue McCormick, Director
Detroit Water and Sewerage Department
735 Randolph Street
Detroit, MI 48226

cc: Director Sykes Mello Orr 4-1 MIS C Dates Hurtel

Re: Term Agreement
Genesee County Drain Commissioner, County Agency

Dear Director McCormick:

We have received and reviewed your letter dated December 12, 2014. As stated in your letter, DWSD and GCDC have been working towards a mutually agreeable solution to a situation that is very unique. In essence, GCDC and DWSD are negotiating toward a short-term, full service contract and a long-term emergency service contract. DWSD currently does not have any contract like this, so there have been many details to work out during our negotiations. There remain two (2) issues that need to be resolved: the cost versus the benefit of the emergency service and the fixed fees that need to be paid during the full service period. During our last conversation with representatives of your office, the later issue may be resolved. With that said, GCDC has committed to negotiating with DWSD to try and reach a mutually acceptable contract for short-term, full service and long-term emergency water supply.

I think it is beneficial to review the time line of events that have transpired.

December 20, 1965	The City of Flint and City of DWSD signed a 35 year contract, which expired on December 31, 2000. The contract continued on a year to year basis thereafter with a one year termination notice provision. A key item in this contract was that DWSD gave franchise rights to the City of Flint for all of Genesee County. As a result, Genesee County could not be a direct customer of DWSD.
April 12, 2013	After the announcement that Flint signed as a constituent member of the KWA, DWSD sent the City of Flint a notice of termination of the contract to be effective April 2014.
November 2013	DWSD/GCDC/DEQ/State met TO DISCUSS Flint's decision process for deciding to go to KWA or stay with DWSD. Also discussed transition if separation was to occur.
April 17, 2014	Contract terminated by DWSD, City of Flint still purchased water, GCDC still purchased water, and Detroit modified its rate to a non-contract customer rate.

April 30, 2014	City of Flint stopped receiving water from DWSD. GCDC closed two valves isolating Flint from the system. Closing the valves was witnessed by personnel of DWSD.
May 1, 2014	GCDC acquired the meter pit then FL-1 now GN-01 from Flint and GCDC became a direct non-contract customer of DWSD.
May and June 2014	GCDC paid its portion of the Flint rate 2013/2014 rate plus a penalty for non-contract status.
July 1, 2014	DWSD and GCDC determined the usage patterns for GCDC.
August 8, 2014	DWSD established a contract rate and a non-contract rate based on GCDC flows and ownership of the meter pit. DWSD billed the new non-contract rate effective July 1, 2014.
November 2014	Negotiations reach an impasse. DWSD says it's going to add additional penalty to GCDC rates.
December 2014	DWSD sends notice that DWSD is going to recommend an additional $1,287,600 to GCDC rates because GCDC is unique.

We have enclosed our rate structure for the past year and the calculation of that rate. Our "current rates" as described in the December 12 letter already includes a penalty and now DWSD in mid-year wants to add an additional penalty.

Back in November of 2013, we all met in Detroit with the Governor regarding water rates and Flint's evaluation of DWSD versus KWA. At that meeting, you spoke of stranded costs and your obligation to recover those costs. Flint signed a 35 year contract. Flint remained a customer for 49 years until DWSD terminated its contract with Flint. There are no stranded costs remaining and if there are, those stranded costs rightfully belong with Flint, who was the contract holder with DWSD. Flint has fulfilled its contractual obligations and upon fulfilling those obligations, DWSD has never identified any stranded costs. Therefore, stranded costs are not at issue in our negotiations and they should not be included in the rate model applied to GCDC.

Since you terminated the contract with Flint, the volume of water has been reduced by 12-18 mgd to the Flint/GCDC area. What new capital investment can you point to that was for the benefit of GCDC? Please provide the legal argument that GCDC might be responsible for these costs. Keep in mind that GCDC has never signed an agreement with DWSD committing it to capital costs for any DWSD projects. GCDC has always made it clear that we would like full service from DWSD through 2016. After that, we were desirous of a mutual aid/backup supply agreement.

The State of Michigan requires a true cost of service in rate making for utilities serving greater than 1% of the State's population. DWSD falls into this category. For your 2013-2014 Budget, you set the rates for all customers by terminating Flint and charging an additional penalty – you received a windfall of revenue from the penalty. For your 2014-2015 Budget, you did not include Flint or GCDC in your rate calculation. The water revenue and penalty paid by GCDC is a windfall. Now mid-year, you are requesting an additional surcharge for the balance of the year – another windfall.

As you stated, we are unique. This uniqueness was identified in August of 2014 when you established a rate for GCDC outside of your rate model. In comparison to your contract customers, GCDC is unique. Contract customers are calculated by the model, even though GCDC rates are calculated by the model, GCDC pays a non-contract penalty as a percentage. This penalty is not paid by contract customers. Additionally, GCDC pays 80% of its rates in fixed fees. Contract customers pay 40% of its rates in fixed fees. Finally, it appears GCDC's rates can be changed arbitrarily at the whim of the Director and Board. Contract customers cannot.

This new proposed rate is vindictive, insulting and illegal. Both Genesee County and the City of Detroit are subdivisions of the State of Michigan. Should these punitive rates be put into effect, we will aggressively pursue all remedies available. With respect to the Governor, we have honored his request to not sue DWSD, but that is a request he can no longer expect us to honor.

Your statement that GCDC is in a fundamentally different position from Flint and other customers of DWSD as GCDC is correct, as GCDC has never been a contractual customer of DWSD. It is important here to recognize that due to the actions of DWSD in giving the franchise rights to the City of Flint for all of Genesee County, it was not possible for GCDC to be a customer. DWSD's actions are the only reason GCDC has never been a contract customer of DWSD. Flint was the only "old contract" customer that had their contract terminated. Why?

If it is the intent of DWSD to recapture capital costs associated with DWSD infrastructure investments, DWSD should have pursued these claims against the City of Flint when DWSD terminated its relationship with Flint. In essence, your argument is that any new customer to your system should be required to pay for prior improvements to the DWSD system even though the improvements were for a different customer of DWSD, the fact remains that the GCDC/Flint area uses 40% less water volume today than 8 months ago when Flint was also purchasing water from DWSD. DWSD has not needed to upgrade its infrastructure, nor has GCDC requested DWSD to do so, to furnish less water to the Genesee County area. Therefore, to establish another new rate for a non-contract customer to recoup capital investment that was never committed to that customer demonstrates clearly that this is a play to force GCDC into a long-term agreement with DWSD or results in a punitive charge.

GCDC and DWSD have been negotiating a short-term/long-term contract. GCDC does not need a backup supply from DWSD. We are willing to consider one if the cost is beneficial to our system. DWSD is the one that is requiring a thirty year agreement not GCDC. When GCDC separates from DWSD, there is significant infrastructure that will be mothballed or abandoned by

DWSD. GCDC has offered to purchase the infrastructure from DWSD. This sale would be beneficial to both systems. These negotiations have been put in jeopardy by your threat to increase our rates unless we meet your demands for a long-term agreement.

Due to the above, GCDC has no choice but to suspend negotiations until this issue is resolved.

On a final note, it is interesting that you sent this letter the day after the Emergency Manager resigned.

Sincerely,

John F. O'Brien, P.E., Director
Division of Water and Waste Services

CC: Governor Snyder
Dan Wyant, Director, DEQ
Mayor Mike Duggan
Jeff Wright, GCDC
Laurie Koester, Esq.
Kevin Kilby, Esq.

RECEIVED

DEC 26 2014

EXECUTIVE DIVISION
Department of Environmental Quality

WATER RATE HISTORY

Flint/GCDC
The consistent way to look at the rate by comparison of the aggregate value when it is a combination of fixed fee and commodity rate.

July 2012 – June 2013 (Flint/Genesee)

Fixed Rate	$8,484,000
Commodity	$12.46
Aggregate Rate	$19.11

July 2013 – June 2014 (Flint/Genesee) (Rate through April 17, 2014)

Fixed Rate	$8,856,072
Commodity	$13.01
Aggregate	$20.39

April 17, 2014 – May 2014

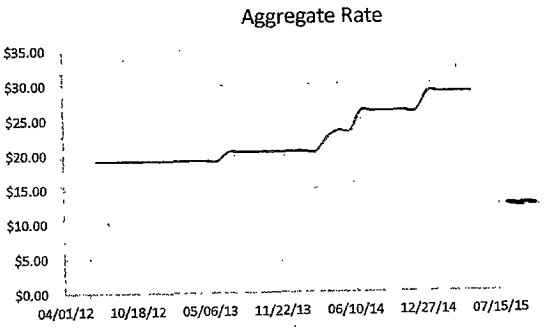
Fixed Rate	$9,776,592
Commodity	$14.35
Aggregate	$22.50

May 1 – June 30, 2014

Fixed Rate	$5,080,800
Commodity	$15.18
Aggregate	$23.37

July 2014 – December 2014

Fixed Rate	$13,792,800
Commodity	$3.89
Aggregate	$26.14



January 1, 2015 – June 2016
Proposed

Fixed Rate	$15,451,200
Commodity	$3.89
Aggregate	$28.81

Another way to look at our rates is as the change in percentage:

Rates on Notice of Terminatio	$20.39	
Current Rates	$26.14	28% in 19 months
Proposed Rates	$28.84	42% in 19 months

The cost of the penalty to GCDC since the termination of the DWSD/Flint contract:

Rate on Termination	$20.39
Rate on Non-Contract	$22.50
Difference	$2.11
Cost for April 17 – June 30	$264,910.50
Volume: 185,550	

As stated by DWSD in August of 2014:

Rates Contract 2014 – 2015	$23.16
Rates Non-Contract 2014-201	$26.14
Difference	$2.98
Cost July 1 – December	$923,800
Volume: 310,000	

As stated by DWSD in August of 2014:

Rates Non-Contract	$23.16
Rates Proposed	$28.81
Difference	$5.65
Cost January 1 – June 30, 201	$1,751,500
Volume: 310,000 (estimated)	

Current total:	$1,888,710.50
Projected total: (Same rate)	$2,112,510.50
Projected total: (New rate)	$2,940,210.50

FYI RB/DM/EC/DS JW/VB

CITY OF DETROIT
WATER AND SEWERAGE DEPARTMENT
OFFICE OF THE DIRECTOR

735 RANDOLPH STREET
DETROIT, MICHIGAN 48226-2830
WWW.DETROITMI.GOV

January 12, 2015

Mr. Darnell Earley, Emergency Manager
Mr. Dayne Walling, Mayor
City of Flint
1101 S. Saginaw Street
Flint, Michigan 48502

Dear Messrs. Earley and Walling:

Regarding: Re-establishing Detroit Water and Sewerage Department Water Service

I was recently referred to a report in MLive in which there was reference to the City of Flint (City) potentially re-visiting its decision to utilize Flint River water as a water source prior to the completion of the KWA pipeline. Within that report, there appeared to be some incorrect assumptions about the cost of water service from the Detroit Water and Sewerage Department (DWSD). I write to you today to express the willingness of DWSD to resume delivery of drinking water to the City and its residents. We have monitored the water quality issues that have troubled the City since May, 2014, and understand that many of the difficulties stem from the limited access to source water. Please know that DWSD is ready, willing and able to resume service to the City if you so desire.

If the City is interested in a long term arrangement with DWSD, with this goal in mind, we offer that the City can immediately reconnect to the DWSD system at no additional charge to the City and at the same "expired contract" rate that the City was paying in April, 2014, modified to reflect the 4% increase experienced by all other wholesale customers in July, 2014. The resulting rate structure is a fixed monthly rate of $846,700 and a commodity rate of $14.92/Mcf. In order to facilitate contract negotiations, DWSD is willing to extend this rate to the City (and to Genesee County as the City's partner and former customer) until June 30, 2015.

We at DWSD take very seriously the matter of drinking water quality, and we are as concerned as you must be by the continued quality issues faced by the City. We are confident that DWSD can provide you with a solution for reliable, safe, high quality water on an expeditious timeline. Please contact me directly at (313) 224-4701 if you wish to discuss this offer further.

Sincerely yours,

Sue F. McCormick
Director

cc: Governor Rick Snyder – (via U.S. Mail)
Flint City Council, (via U.S. Mail and Electronic Mail)
Eric Mays; Jacqueline Poplar (c/o Jennie Johnson); Kerry Nelson (c/o Jennie Johnson); Joshua Freeman; Wantwaz Davis; Herbert Winfrey (c/o Jennie Johnson); Monica Galloway, Vicki VanBuren; Scott Kincaid (c/o Jennie Johnson)
Jeff Wright, GCDC – (via Electronic Mail)
Mayor Mike Duggan (via Electronic Mail)
James Fausone, BOWC (via Electronic Mail)
Robert Daddow, GLWA (via Electronic Mail)

Detroit offers Flint 'long-term' deal for Lake Huron water with no reconnection fee

Ron Fonger | rfonger1@mlive.com By **Ron Fonger | rfonger1@mlive.com**
on January 16, 2015 at 5:51 PM, updated January 17, 2015 at 9:50 AM

Sue F. McCormick

FLINT, MI -- The Detroit Water and Sewerage Department says it is "ready, willing and able" to start selling Lake Huron water to Flint again, and wouldn't charge a **$4 million reconnection fee** to get things started.

DWSW made the offer in a Jan. 12 letter to Flint's mayor and emergency manager, but it wasn't immediately clear whether the "long-term arrangement" offered by Detroit was also available for a relatively short-term period.

Flint and Genesee County are expected to have their own source of Lake Huron water once the Karegnondi Water Authority completes work on a new transmission pipeline by the end of 2016.

The city and county are partners in the KWA. The emergency manager's office issued a statement Friday, Jan. 16, saying the DWSD proposal would increase the cost of water by more than $12 million per year at the proposed rates, and could increase even more because rates are subject to change after July 1.

"This increase in costs would not be in the best interests of the city or its water users, as the city is committed to assuring safety and improving water quality by following its current plan, and reconnecting to DWSD would likely require deferment of existing capital improvements or an additional increase in rates," the statement says.

DWSD Director Sue F. McCormick's letter said Flint residents can go back to drinking lake immediately -- something some City Council members have advocated.

The letter says Detroit would sell treated lake water to Flint for a fixed monthly rate of $846,700 and $14.92 per 1,000 cubic feet as part of a "long-term arrangement" between the two cities.

Flint Mayor Dayne Walling declined to comment on the offer and has said he doesn't believe Detroit is part of the solution to Flint's water challenges

But 1st Ward Councilman Eric Mays said the offer opens the door to further talks.

Mays said he's talked to McCormick and wants the director to be part of a panel discussion about Flint's water supply next week.

"The people I'm talking to want good water yesterday," Mays said. "She said we can cut it (the water) on, cut it off" as needed.

Asked whether the DWSD offer would be available for just a few years, DWSD spokesman Greg Eno said in an email that McCormick's letter "speaks for itself."

"DWSD is wide open to sitting down with the Flint officials to further discuss how the department might be able to provide a solution to the city's water quality issue," Eno said.

Detroit's offer to re-establish a water supply to the city comes as Flint has struggled to harness the Flint River as a source of drinking water -- an effort that started in April.

Flint is in violation of the Safe Drinking Water Act because of the high level of trihalomethanes in water tested last year. Residents in scattered areas were hit by boil water advisories because of bacteria in 2014, the first time the city used the Flint River as its drinking water source in 50 years.

Resident have protested the price and quality of river water in various meetings since the switch. Several of the meetings have come since the trihalomethanes violation was reported to residents two weeks ago.

McCormick said she wrote to city officials here after reading about Flint's water problems on MLive-The Flint Journal.

Lockwood, Andrews & Newnam, an engineering contractor for Flint, raised the question of reverting to water from the Detroit in a Nov. 26 report to the city.

The report concludes that "utilizing the DWSD for interim supply is cost-prohibitive under the terms defined by DWSD," but McCormick said in her letter that the report appears to have been based on "some incorrect assumptions."

"I write to you today to express the willingness of DWSD to resume delivery of drinking water to the city and its residents," her letter says.

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Flint mayor tells governor: Lower water connection fees, offer amnesty program for turn-ons

Ron Fonger | rfonger1@mlive.com By **Ron Fonger | rfonger1@mlive.com**
on January 20, 2015 at 6:15 PM, updated January 20, 2015 at 6:18 PM

Flint Mayor Dayne Walling shuts off a valve to close the supply of water from Detroit to Flint in this April 25, 2014, file photo.

FLINT, MI -- Mayor Dayne Walling says access to clean, safe, affordable water is a basic human right, and Gov. Rick Snyder has the responsibility for helping to deliver it.

Walling, in a post on his re-election campaign Web site on Monday, Jan. 19, called for Snyder to take actions ranging from lowering charges for new water customers in Flint to requiring more frequent reporting on water test results statewide.

"Both the state and federal government need to be actively involved in improving Flint's water system," Walling said Tuesday, Jan. 20. "The governor has a particular responsibility due to Public Act 436," the state's emergency manager law.

The mayor said his request has been sent to Snyder, and he asked his supporters to contact the governor as well if they want "to implement my plan and ensure Flint's water is safe."

Dave Murray, a spokesman for Snyder, said the mayor's request will be taken under consideration once it is received. Flint has been under state financial management since 2011 and Walling and the Flint City Council have had limited involvement in City Hall decision-making since.

Walling's plea to the governor comes as Flint officials are working to reassure customers about the quality of their water, which is the most expensive of any municipality in Genesee County.

The city is hosting a water presentation on Wednesday, Jan. 21, detailing water treatment, distribution and steps taken to ensure that "citizens get water that meets all regulatory safety and quality standards."

The presentation and Walling's request to the state come in the same month that the city told customers that Flint was in violation of the Safe Drinking Water Act because of the high level of trihalomethane (TTHM) in drinking water samples last year.

Earlier in 2014, several boil water advisories were also issued by the city because of issues with bacteria found in water in some parts of the city.

Walling has been among city officials who have tried to reassure customers that Flint water is safe. The city began using the Flint River as a temporary source of drinking water in April.

But the mayor said Tuesday that changes are needed in addition to calming words.

"It's non-negotiable that the city will have a safe and affordable water system going forward," he said. "Clearly, there are a number of unresolved issues with the current system."

"Everybody deserves an opportunity to pay their bill and get back in good standing" the maayor said. The city's water system "is better off from a health and financial perspective with more customers," he said.

The new plan is general in its outline, but is patterned in some ways after changes made to the Detroit water system, according to Walling.

Here are some of his requests to the state:

- Support alternatives for those advised not to drink the water by their doctors through the Michigan Health Endowment Fund and community partners to protect senior citizens and infants.
- Hire experienced river water treatment operating management in Flint.
- Require water testing data to be released quarterly by law in all Michigan communities.
- Announce an amnesty program aimed at making it easier for people to have water service reconnected and reduce the turn-on cost in Flint.
- Develop a revised payment plan policy to allow customers to come back to the Flint system, and establish a new statewide Drinking Water Emergency Assistance Fund.
- Accelerate water system improvements outlined in Flint's Capital Improvement Plan through federal and state investments.

Provide federal and state forgiveness of payments to the Drinking Water Revolving Loan Fund and federal and state financing for future improvements.

- Develop a community partnership to provide household and business customers with information on testing and conservation.

- Expand a youth energy initiative to assist households with conservation and efficiency. A pilot program was carried out in summer 2014 with Northwestern High School students, EcoWorks and Consumers Energy.

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STATE OF MICHIGAN CONTRACT NO. 271N3200089

CITY OF FLINT WATER SUPPLY ASSESSMENT

At the request of the Treasurer, Tucker, Young, Jackson, Tull, Inc. (TYJT) makes the following recommendation to the Department of Treasury concerning Flint's water supply alternatives. Based on the financial analysis performed of the various options presented by DWSD to continue treated water service to Flint compared to Flint being supplied by the new KWA untreated water system, TYJT believes that several of the options presented by DWSD are lower in cost currently and over the long run than the one offered by KWA. TYJT also believes that DWSD's most recent offer (subsequent to the submittal of our report) to build a smaller parallel water main from Imlay to Flint, funded by the entire DWSD base of customers, is the best solution offering the least cost alternative and the required redundancy by MDEQ.

Furthermore, since a majority of the KWA system has not been designed and none of the system has been constructed, there is an additional risk that the cost of the KWA system may actually be higher than estimated due to potential construction delays and unforeseen conditions. This risk to Flint could be substantial since the city is responsible for 30 percent of the KWA design and construction costs while still having to purchase water from DWSD during the construction period.

Finally, there are other issues that were identified in our report that may result in risks to Flint if it were to join KWA that should be considered by the Treasury in determining how Flint's potable water should be supplied. These issues are related to redundancy and reliability, other items affecting cost, and Flint's desire to control its own destiny related to its water supply. These are described further below.

- DWSD's supply to Flint is via a 72-inch water main from Imlay City. This main also supplies Imlay City, Mayfield and the Greater Lapeer County Utilities Authority (GLCUA). The volume of water contained within the 72-inch main is approximately 30 million gallons. If Genesee and Flint move to KWA then the three remaining communities' consumption would most likely not be large enough to maintain fresh water in DWSD's pipeline (due to loss of chlorine residual). DWSD may consider shutting down the 72-inch line completely due to the water quality concerns, which would then create an additional burden for Imlay, Mayfield and GLCUA to finance treated water supplies.
- The KWA supply option is counter to the Treasury's Competitive Grant Assistance Program (Formerly EVIP Grant). This program has been put in place to allow for communities to consolidate their services and save money. Two existing customers of DWSD (Flint and Genesee County) along with the potential of others customers (GLCUA, Mayfield, Imlay City) separating from another water system is in contradiction to the program.
- There is a concern over the ability of smaller systems (KWA) over larger systems (DWSD) to pay for future unfunded mandates and regulations. Obviously, identifying regulation requirements over 30 years is hard to determine. However, it is widely accepted that a large system has greater ability to respond to unfunded mandates because the cost can be distributed over a large customer base.
- Although Flint will be responsible for 30 percent of the construction cost, they will only have a minority vote on the KWA board. Furthermore, there are other communities (Lapeer County, the City of Lapeer, and Sanilac County) that sit on the board and vote. However, they are not purchasing water nor contributing to the construction costs. Their position on the KWA Board will not provide them an ability to "control their own destiny," as they have stated to the Treasury.

DWSD Worksheet : 18 MGD Maximum Day Customer with Model Contract Twinning Line and Owning both to the Flint WTP

Capacity

Flint ADD:	0.00	MGD	-	MCF/Day
DWSD ADD:	12	MGD	1,604	MCF/Day

Annual Volume

Flint:	-	MCF
DWSD:	585,561	MCF

2013 Cost of Supply

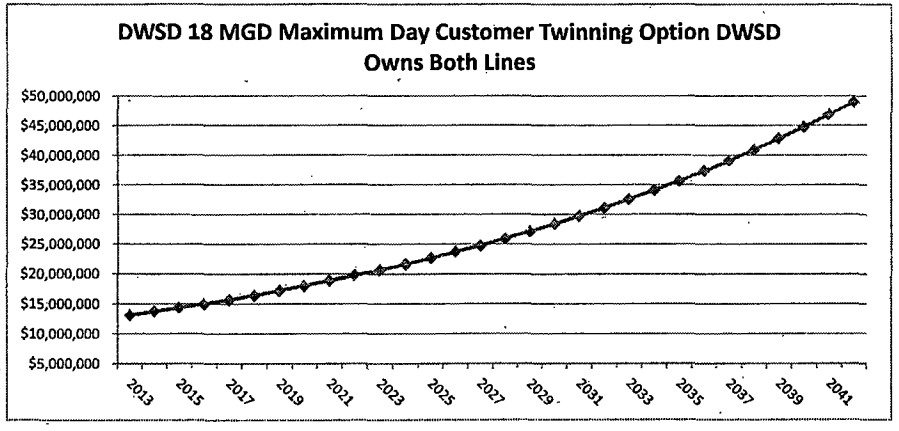
Flint WTP O&M:	-	/MCF	$ -	/Yr
DWSD:	$ 17.08	/MCF	$ 10,001,390	/Yr

Escalation/Inflation Rate

Flint:	4.51% /Yr
DWSD:	4.7% /Yr

Capital Expenditure

Amount:	$ -		
Reserve:	$ -	0%	Reserve Rate: 0.00%
Amount plus Reserve:	$ -		
Revenue Bond Rate:	5%		
Number of Years:	25		
Annual Cost:	$0		



	Year	Flint WTP O&M	Water Purchase	Revenue Bond Payment	Interest on Reserve	TOTAL
1	2013	$ -	10,001,390		-	$ 10,001,390
2	2014	$ -	10,471,456		-	$ 10,471,456
3	2015	$ -	10,963,614		-	$ 10,963,614
4	2016	$ -	11,478,904		-	$ 11,478,904
5	2017	$ -	12,018,412	-	-	$ 12,018,412
6	2018	$ -	12,583,278	-	-	$ 12,583,278
7	2019	$ -	13,174,692	-	-	$ 13,174,692
8	2020	$ -	13,793,902	-	-	$ 13,793,902
9	2021	$ -	14,442,216	-	-	$ 14,442,216
10	2022	$ -	15,121,000	-	-	$ 15,121,000
11	2023	$ -	15,831,687	-	-	$ 15,831,687
12	2024	$ -	16,575,776	-	-	$ 16,575,776
13	2025	$ -	17,354,838	-	-	$ 17,354,838
14	2026	$ -	18,170,515	-	-	$ 18,170,515
15	2027	$ -	19,024,529	-	-	$ 19,024,529
16	2028	$ -	19,918,682	-	-	$ 19,918,682
17	2029	$ -	20,854,860	-	-	$ 20,854,860
18	2030	$ -	21,835,039	-	-	$ 21,835,039
19	2031	$ -	22,861,286	-	-	$ 22,861,286
20	2032	$ -	23,935,766	-	-	$ 23,935,766
21	2033	$ -	25,060,747	-	-	$ 25,060,747
22	2034	$ -	26,238,602	-	-	$ 26,238,602
23	2035	$ -	27,471,816	-	-	$ 27,471,816
24	2036	$ -	28,762,992	-	-	$ 28,762,992
25	2037	$ -	30,114,852	-	-	$ 30,114,852
	2038	$ -	31,530,250	-	-	$ 31,530,250
	2039	$ -	33,012,172	-	-	$ 33,012,172
	2040	$ -	34,563,744	-	-	$ 34,563,744
	2041	$ -	36,188,240	-	-	$ 36,188,240
	2042	$ -	37,889,088	-	-	$ 37,889,088
		$ -				

25 Yrs Cummulative
$ 458,060,853

30 Yrs Cummulative
$ 631,244,349

DWSD Worksheet : 18 MGD Maximum Day Customer with Model Contract Twinning Line and Owning Only New Line to the Flint WTP

Capacity

Flint ADD:	0.00	MGD	-	MCF/Day
DWSD ADD:	12	MGD	1,604	MCF/Day

Annual Volume

Flint:	-	MCF
DWSD:	585,561	MCF

2013 Cost of Supply

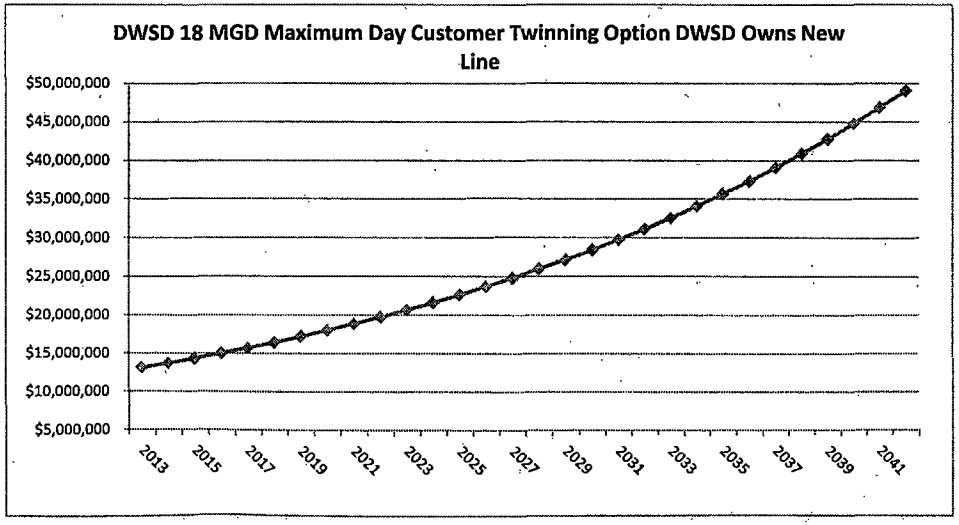
Flint WTP O&M:	-	/MCF	$ -	/Yr
DWSD:	$ 17.40	/MCF	$ 10,188,770	/Yr

Escalation/Inflation Rate

Flint:	4.51% /Yr
DWSD:	4.7% /Yr

Capital Expenditure

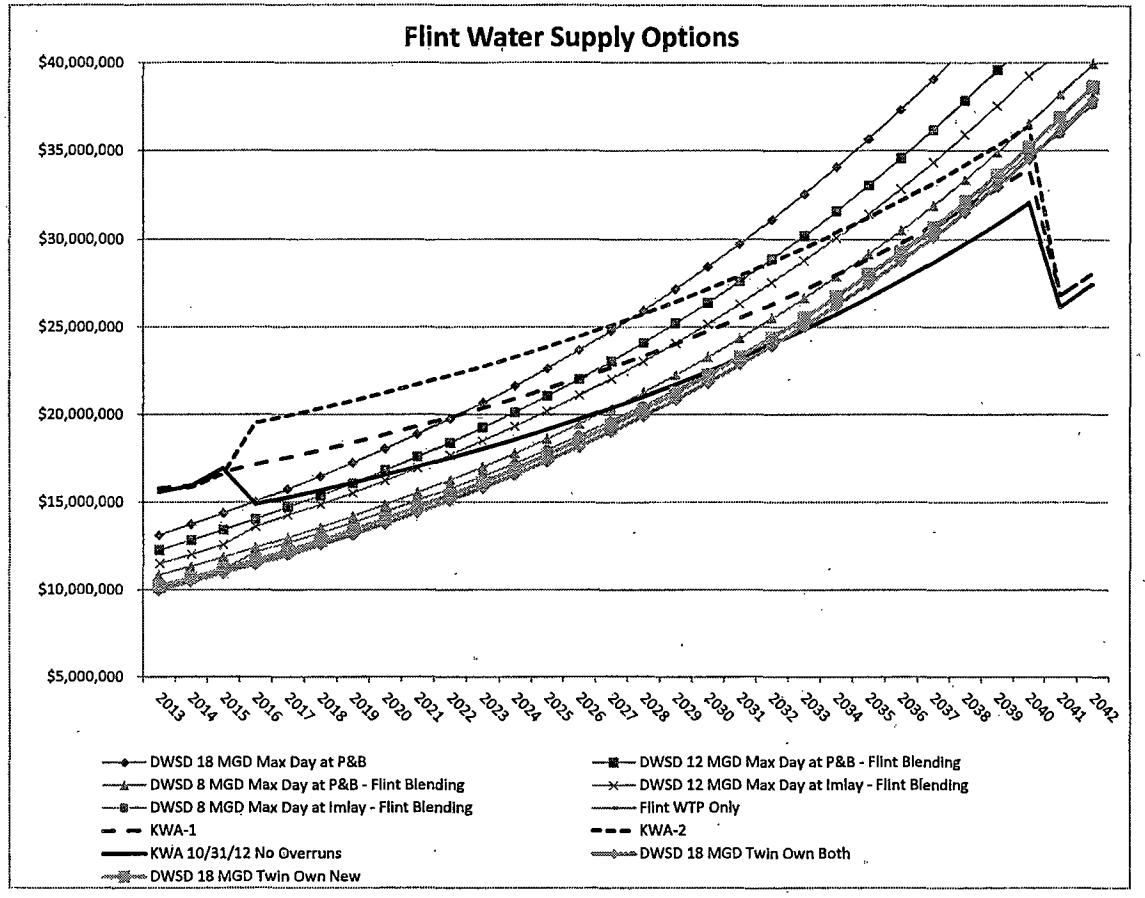
Amount:	$ -		
Reserve:	$ -	0%	Reserve Rate: 0.00%
Amount plus Reserve:	$ -		
Revenue Bond Rate:	5%		
Number of Years:	25		
Annual Cost:	$0		



	Year	Flint WTP O&M	Water Purchase	Revenue Bond Payment	Interest on Reserve	TOTAL
1	2013	$ -	10,188,770		-	$ 10,188,770
2	2014	$ -	10,667,642		-	$ 10,667,642
3	2015	$ -	11,169,021		-	$ 11,169,021
4	2016	$ -	11,693,965		-	$ 11,693,965
5	2017	$ -	12,243,582	-	-	$ 12,243,582
6	2018	$ -	12,819,030	-	-	$ 12,819,030
7	2019	$ -	13,421,525	-	-	$ 13,421,525
8	2020	$ -	14,052,336	-	-	$ 14,052,336
9	2021	$ -	14,712,796	-	-	$ 14,712,796
10	2022	$ -	15,404,297	-	-	$ 15,404,297
11	2023	$ -	16,128,299	-	-	$ 16,128,299
12	2024	$ -	16,886,330	-	-	$ 16,886,330
13	2025	$ -	17,679,987	-	-	$ 17,679,987
14	2026	$ -	18,510,946	-	-	$ 18,510,946
15	2027	$ -	19,380,961	-	-	$ 19,380,961
16	2028	$ -	20,291,866	-	-	$ 20,291,866
17	2029	$ -	21,245,584	-	-	$ 21,245,584
18	2030	$ -	22,244,126	-	-	$ 22,244,126
19	2031	$ -	23,289,600	-	-	$ 23,289,600
20	2032	$ -	24,384,211	-	-	$ 24,384,211
21	2033	$ -	25,530,269	-	-	$ 25,530,269
22	2034	$ -	26,730,192	-	-	$ 26,730,192
23	2035	$ -	27,986,511	-	-	$ 27,986,511
24	2036	$ -	29,301,877	-	-	$ 29,301,877
25	2037	$ -	30,679,065	-	-	$ 30,679,065
	2038	$ -	32,120,981	-	-	$ 32,120,981
	2039	$ -	33,630,667	-	-	$ 33,630,667
	2040	$ -	35,211,309	-	-	$ 35,211,309
	2041	$ -	36,866,240	-	-	$ 36,866,240
	2042	$ -	38,598,953	-	-	$ 38,598,953
		$ -				

25 Yrs Cummulative
$ 466,642,790

30 Yrs Cummulative
$ 643,070,941



Option	Costs through 2042	Ranking
Flint WTP Only	$ 590,441,893	1
DWSD 8 MGD Max Day at Imlay	$ 634,795,488	2
KWA 10/31/12 Update	$ 649,775,166	3
DWSD 8 MGD Max Day at P&B	$ 672,671,705	4
KWA-1	$ 707,279,715	5
DWSD 12 MGD Max Day at Imlay	$ 725,576,803	6
DWSD 12 MGD Max Day at P&B	$ 762,110,308	7
KWA-2	$ 766,784,313	8
DWSD 18 MGD Max Day at P&B	$ 821,226,268	9
DWSD 18 MGD Max Twin Own Both	$ 631,244,349	
DWSD 18 MGD Max Own New Line	$ 643,070,941	

Summary of FY 2013-14 DWSD Cost Allocations to Flint Under Various Scenarios

Flint Only

		Revenue Requirement	Rates and Charges		
			Fixed	Commodity	*Avg Unit Cost*
1	**Status Quo *(Flint Portion)***	12,574,900	379,304	13.01	*20.39*
2	**Suggested Cct *(Flint Portion)***	11,281,100	351,661	12.06	*19.27*
3	Change	(1,293,800)	(27,643)	(0.95)	*(1.12)*
4	% Change	-10.3%	-7.3%	-7.3%	*-5.5%*
5	**Max Day Only**	9,904,300	294,542	10.87	*16.91*
6	Change	(1,376,800)	(57,119)	(1.19)	*(2.36)*
7	% Change	-13.9%	-19.4%	-10.9%	*-14.0%*
8	**Add CTA Line to BP**	10,093,100	310,271	10.87	*17.23*
9	Change	188,800	15,729	0.00	*0.32*
10	% Change	1.9%	5.1%	0.0%	*1.9%*
11	**CTA to BP / Flint only to FWTP**	12,446,300	506,371	10.87	*21.25*
12	Change	2,353,200	196,100	0.00	*4.02*
13	% Change	18.9%	38.7%	0.0%	*18.9%*
14	**Add CTA Line to FWTP**	10,191,200	318,450	10.87	*17.40*
15	Change	(2,255,100)	(187,921)	0.00	*(3.85)*
16	% Change	-22.1%	-59.0%	0.0%	*-22.1%*
17	**CTA to FWTP / Buy existing 72**	10,009,600	303,315	10.87	*17.08*
18	Change	(181,600)	(15,135)	0.00	*(0.32)*
19	% Change	-1.8%	-5.0%	0.0%	*-1.9%*
20	Cumulative Change	(2,565,300)	(75,989)	(2.14)	*(3.31)*
21	Cumulative % Change	-20.4%	-20.0%	-16.4%	-16.2%

		Assumptions			DWSD Investment	
		Avg Day *mgd*	Max Day *mgd*	Peak Hour *mgd*	CTA *$*	Flint Only *$*
1	**Status Quo**	24.6	45.6	47.7	0	0
2	**Suggested Contract**	23.4	**40.6**	**42.4**	0	0
3	**Max Day Only**	**12.0**	**18.0**	**18.0**	0	0
4	**Add CTA Line to BP**	12.0	18.0	18.0	62,290,800	0
5	**CTA to BP / Flint only to FWTP**	12.0	18.0	18.0	62,290,800	32,391,300
6	**Add CTA Line to FWTP**	12.0	18.0	18.0	94,682,100	0
7	**CTA to FWTP / Buy existing 72**	12.0	18.0	18.0	94,682,100	(2,500,000)

STATE OF MICHIGAN CONTRACT NO. 271N3200089

CITY OF FLINT WATER SUPPLY ASSESSMENT

February 2013

For Submittal to:

State of Michigan, Department of Treasury



Submitted by:

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1. INTRODUCTION

Tucker, Young, Jackson, Tull, Inc. (TYJT), at the request of the State Treasurer performed an analysis of the water supply options being considered by the City of Flint. The City of Flint is presently supplied potable water from the Detroit Water and Sewerage Department (DWSD). This supply is from a single 72-inch water main that terminates at a master meter located at Potter and Baxter. Additionally, downstream of the DWSD master meter, Flint supplies its customer Genesee County. The City of Flint also operates a water treatment plant that uses the Flint River as its source of supply to provide back up and redundancy to the DWSD supply as required by MDEQ

The Karegnondi Water Authority (KWA) is planning on constructing a raw water supply system that could provide Lake Huron water to the Flint Water Treatment Plant. Flint's existing plant would be upgraded to treat the new raw water source.

The State Treasurer has appointed an emergency financial manager for the City of Flint. As such the Treasurer has requested TYJT to provide an analysis of the water supply options to assist the Treasurer in determining any potential risk and the best course going forward for supplying potable water to the City of Flint.

Report Organization

The following sections of this report are described below:

Section 2 – The basis of the analysis is described in this section. The options include the KWA option and several options offered by DWSD.

Section 3 – A significant amount of information and data was collected including memorandums, reports, drawings, financial reports, and other documents. This section summarizes the information used in the analysis.

Section 4 – This section describes the evaluation of the cost of supply for the Flint options. The costs are comprised of the initial cost of operations plus the annual rate of escalation/inflation.

Section 5 – The evaluation process used to analyze the construction costs associated with the KWA supply system is described in this section. Additionally, the cost of financing the capital requirements is described.

Section 6 – This section presents the financial review of the options considered to supply potable water to Flint. A summary of these options is also provided.

Section 7 – In addition to the financial analysis other considerations were identified that should be considered in understanding the risks and determining the best option to supply Flint. They include items related to cost, redundancy and reliability, and Flint's ability to control their future cost of water supply.

2. FLINT WATER SUPPLY OPTIONS

Two water purveyor options were evaluated; the KWA water supply system and continued supply from DWSD. Both suppliers would provide water from Lake Huron as the source. The KWA system is a raw water supply, which means that the water would have to be treated by Flint before distributing the potable water to its customers. The DWSD supply is potable or "finished" water and would not need additional treatment.

Additionally, an option for the Flint WTP to supply the City of Flint without being supplied from either DWSD or KWA was initially considered. The preliminary investigation evaluated the cost associated with the required improvements to the plant and to the Flint River dam system. Although it appeared that this was a viable option, Flint in a meeting on December 20, 2012 with the Treasury, stated that the City did not want to pursue the option and it is no longer being considered.

Karegnondi Water Authority (KWA) Lake Huron Water Supply

The KWA water supply system schematic is shown in Figure 2-1. The system is comprised of an intake in Lake Huron that supplies water to the Lake Huron Pump Station (LHPS). The LHPS lifts the water and pumps it through an approximately 22 mile long 60-inch pipeline. The pipeline terminates at a 5 MG reservoir and is then pumped from the Intermediate Pump Station (IPS) through approximately 26 miles of 60-inch and 18 miles of 30-inch pipeline to the existing Flint WTP. Downstream of the IPS, approximately half way to the Flint WTP, the 60-inch line would also supply a new Genesee County WTP.

The raw water transmission system has a 60 MGD capacity and is sized to deliver a maximum of 18 MGD to the Flint WTP with an average day supply of 12 MGD. Improvements at the Flint WTP would also be required to treat the lake water as the plant is currently designed to treat the Flint River water.

The term of the KWA contract for Flint is 40 years.

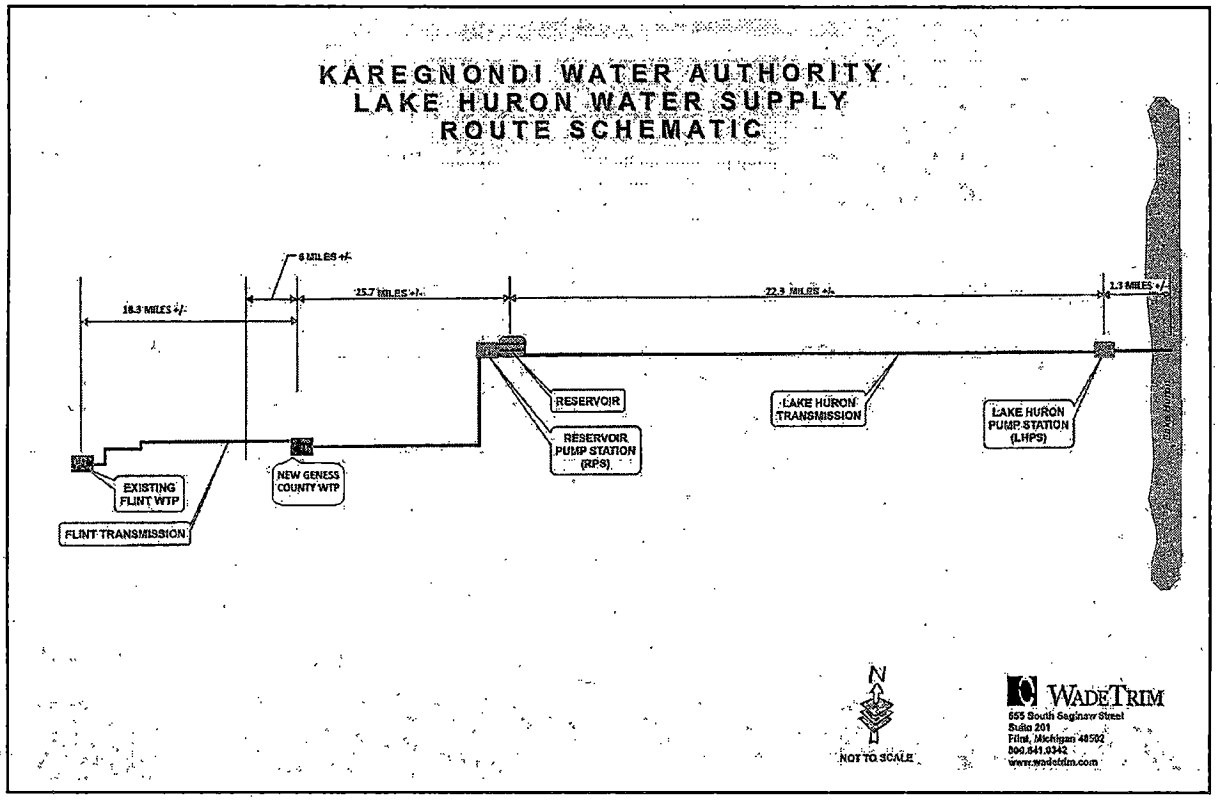


Figure 2-1: KWA Raw Water System

DWSD Water System

The DWSD system schematic is shown in Figure 2-2. Flint is currently supplied by DWSD at Master Meter FL-1, located at Potter and Baxter. Flint typically gets its water from the Lake Huron WTP, located in Fort Gratiot, Michigan; near the Lake Huron shoreline. Water is treated and pumped at the Lake Huron WTP and supplied through a 120-inch pipeline to an intermediate pump station called the Imlay Pump Station. The Imlay Pump Station has 20 MG of reservoir capacity. Depending on the time of year and the DWSD system demand, water is either bypassed directly to Flint or it is re-pumped at Imlay. It should be noted that the DWSD supply to Flint is part of a very large water system and during emergencies or outages water can be supplied from the south up to Flint in lieu of the Lake Huron facility.

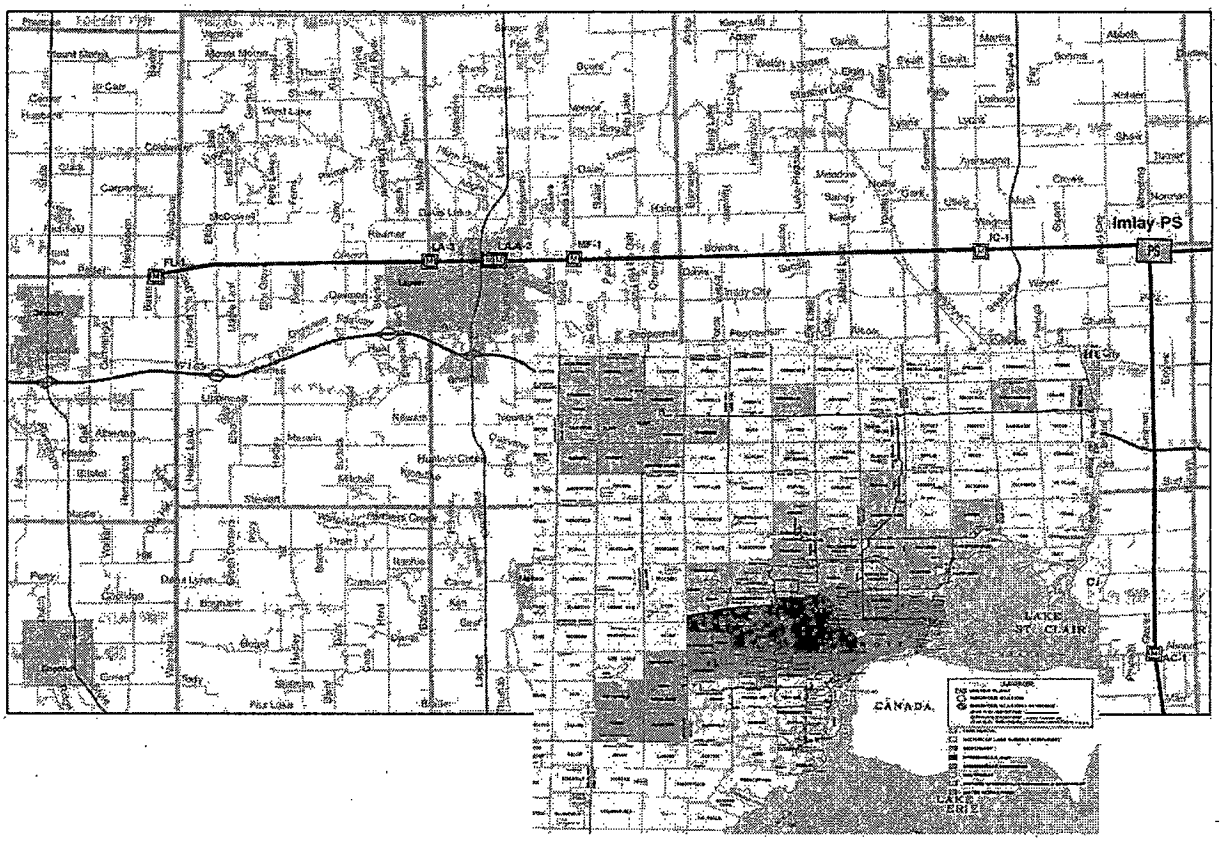


Figure 2-2: DWSD Water System

The pipeline from Imlay to FL-1 is a 72-inch pipeline. It has been estimated that the 72-inch line serving Flint has a capacity in excess of 90 MGD.

DWSD has presented several contractual options to Flint and all of them are based on Flint signing a new 30 year contract. The options shown in Table 2-1 are based on two different supply points; one at the current master meter location FL-1 at Potter and Baxter (P&B) and the other at the location of the Imlay Pump Station.. The reason for the varying options is to provide a lower water rate at the Imlay Station, since the DWSD rate formula is based on distance and elevation factors related to the supply location.

The rates are also dependent on the maximum amount of water DWSD supplies. As example, if DWSD supplies a maximum day demand of 18 MGD that would equal the entire amount of water required by Flint.

For the options less than the maximum of 18 MGD means that the Flint WTP would supplement the difference by supplying water treated from the Flint River. These options are known as "blending" and would allow for Flint to blend two sources of water to supply its customers; the Flint River using the Flint WTP and Lake Huron from DWSD system.

Description	Average Day Demand
18 MGD Maximum Day Customer – FL-1	12 MGD
12 MGD Maximum Day Customer – FL-1	8 MGD
8 MGD Maximum Day Customer – FL-1	8 MGD
12 MGD Maximum Day Customer - Imlay	12 MGD
8 MGD Maximum Day Customer - Imlay	12 MGD

Table 2-1: DWSD Supply Options

3. DATA COLLECTION

During the course of the investigation several documents were used to perform the analysis. The names of the documents are listed below for reference.

KWA and Flint

- Preliminary Engineering Report, Lake Huron Water Supply Karegnondi Water Authority, September 2009;
- Analysis of the Flint River as a Permanent Water Supply for the City of Flint, July 2011;
- Cost Comparison, KWA vs. DWSD, Letter to Mr. Kurtz, October 31, 2012;
- Lake Huron Supply Study, KWA, Appendix 20, October 2012 Preliminary Report Update, Final Report (DRAFT), October 4, 2012;
- Articles of Incorporation of Karegnondi Water Authority, endorsed in 2010;
- Karegnondi Water Authority Bylaws, October 26, 2010;
- KWA Raw Water Supply Contract;
- Flint WTP Statement of Revenues and Expenditures 09' – 12';
- GCDC Division of Water and Waste Services Financial Statements 03' – 11'; and
- Assorted emails with further clarification of questions and documentation.

DWSD

- Historical Rates and Charges to Flint 04' – 13';
- Historical Rates and Charges to Flint with Hypothetical Model Contract 10' – 13';
- 2013 Rates and Charges for the following options:
  - 18 MGD Maximum Day Customer at FL-1;
  - 12 MGD Maximum Day Customer at FL-1 (Flint blending*);
  - 8 MGD Maximum Day Customer at FL-1 (Flint blending*);
  - 12 MGD Maximum Day Customer at Imlay (Flint blending*);
  - 8 MGD Maximum Day Customer at Imlay (Flint blending*); and
- Assorted emails with further clarification of questions and documentation.

* Flint blending based on DWSD supplying two-thirds and Flint one-third of 12 MGD average day demand.

Two meetings were also held; one with DWSD and one with Flint and Genesee County representing KWA. The meetings were held on November 19, 2012 and November 20, 2012, respectively. Minutes from these meetings are included in Appendix A.

4. COST OF SERVICE

Information provided by DWSD, Flint, and representatives of the KWA were used in the cost of service evaluation. To evaluate the annual escalation/inflation rate over the planning period, the rate adjustment for DWSD was estimated based on the recent rate adjustment history. For the KWA system both the estimated cost of operations when the system begins supplying water and the annual rate adjustment or inflation was evaluated. The existing cost of operations and escalation for the Flint WTP was based on actual costs provided and then adjusted depending on the scenario considered. This section describes the evaluation process and the rates used in the analysis.

DWSD Water Supply

The City of Flint has been a customer of DWSD since 1967. The Flint WTP has been maintained as a backup to the DWSD system. As indicated previously, several options were provided by DWSD depending on the type of service Flint was to select. The unit cost of water for each of these options is shown in Table 4-1. These rates are based on DWSD's FY13, which are current until July 2013.

Description	Average Day Demand (MGD)	Unit Rate ($/MCF)
18 MGD Maximum Day Customer – FL-1	12	16.37
12 MGD Maximum Day Customer – FL-1	8	16.31
8 MGD Maximum Day Customer – FL-1	8	12.68
12 MGD Maximum Day Customer - Imlay	12	14.38
8 MGD Maximum Day Customer - Imlay	12	11.11

Table 4-1: Cost of DWSD Supply Options

To determine annual escalation rate, DWSD's last 10 years of history was used along with other large urban water systems in Michigan. The water systems used for benchmarking comparison were: Lansing, Grand Rapids, and Saginaw.

Table 4-2 identifies the annual and average rate of increase to Flint based on supplying water either to the current FL-1 at Potter and Baxter or Imlay. Note the last three years of the rates (FY 2011 through FY 2013) assumes that Flint's cost would be based on the new 30 year contract; FY 2011 being the first year that the new contract was available.

Fiscal Year	Average Unit Cost ($/MCF)	Annual Change (%)
2004	11.06	
2005	10.24	-7.4
2006	10.56	3.1
2007	11.09	5.0
2008	11.35	2.3
2009	13.07	15.2
2010	11.73	-10.3
2011	13.89	18.4
2012	15.08	8.6
2013	16.24	7.7
Average		4.4%

From FL-1

Fiscal Year	Average Unit Cost ($/MCF)	Annual Change (%)
2004	11.06	
2005	10.24	-7.4
2006	10.56	3.1
2007	11.09	5.0
2008	11.35	2.3
2009	13.07	15.2
2010	11.16	-14.6
2011	12.23	9.6
2012	13.28	8.6
2013	14.32	7.8
Average		2.9%

From Imlay

Table 4-2: Recent DWSD Water Rates

Audited financial reports were used to determine the rate of inflation associated with other three large municipal systems. The results are shown in Table 4-3.

Water Systems	Years Evaluated	Average Rate (%)
Lansing	05'-12'	4.6
Grand Rapids	04'-11'	1.6
Saginaw	04'-11'	7.0

Table 4-3: O&M Inflation Rates of Other Large Water Systems

Based on the information analyzed from DWSD and the other communities, it was determined that a fair annual rate of inflation for operations and maintenance cost for the analysis should be 4.4%. The 4.4% has historical significance from Flint's current water supplier and falls within the range of the other communities.

KWA Water Supply

The initial projected O&M cost for the KWA supply would be comprised of KWA's O&M costs as well as Flint's O&M costs. Because there was limited information provided, the initial estimated rate of $1.50/MCF was used. This rate is based on information from the cost comparison analysis attached to the letter to Mr. Kurtz, dated October 31, 2012.

The KWA cost evaluation used an annual O&M inflation rate of 5%. To validate this rate a similar analysis to DWSD's operations and maintenance annual rate of inflation was used. First, in discussions with Flint and the Genesee County Drain Commission (GCDC), they believed that the annual rate of inflation for the new KWA system would be similar to the GCDC Water & Waste Services (WWS). Additionally, two large transmission systems were used to benchmark the inflation rates: the Southeastern Oakland County Water Authority (SOCWA) and the Ypsilanti Utility Community Authority (YUCA). Although both of these systems transmit finished water opposed to raw water, they were considered similar enough for comparison as they are comprised of only large water mains, pumping facilities and storage.

Once again audited financial statements were used to calculate the inflation rates. A summary of the findings are shown in Table 4-4. Based on the fact that the information analyzed showed a large difference between the two systems, it was determined that the KWA assumption of 5% was a good rate of inflation to use in the financial analysis. This rate is almost equally between the GCDC rate and the other two transmission systems.

Systems	Years Evaluated	Average Rate (%)
GCDC WWS	03' – 11'	10.5
SOCWA	04'-12'	--
YUCA	04'-12'	0.7

Table 4-4: O&M Inflation Rates of Other Comparable Systems to KWA

Flint WTP

The Flint WTP currently serves as a backup supply to the DWSD service to Flint. To maintain backup operations, the City of Flint operates the plant approximately 20 days each year. Flint indicated that the average production rate when they operate is 11 MGD.

For the blending options and the KWA supply considered, Flint would be required to operate its plant all year around. Therefore, their operating and maintenance costs were evaluated and adjusted to determine an annual cost associated with year-round operations.

The Flint WTP provided three years of operating costs for the assessment. Additionally, reports listed in Section 3 were also used as reference to determine both operating costs for the plant processing Flint River water (blending options) and Lake Huron raw water (KWA option).

Major cost centers were analyzed to estimate annual operation and maintenance. They included: labor, utilities, chemicals and residual management. In general, as recommended by the Flint plant staff, labor and overhead were increased from the current costs by two-thirds. Additionally, variable costs for power, chemicals and residual cost were increased to estimate full time treatment at the Flint WTP. Data from the KWA Preliminary Report and annual operating data for the Flint WTP (provided separately) were analyzed to make these forecasts.

The annual operating and maintenance costs developed for Flint WTP used are shown in Table 4-5.

Source of Supply	Average Daily Production (MGD)	Estimated Annual O&M Cost
Flint River (Blending with DWSD)	4	$5,895,097
Lake Huron (Supplied by KWA)	12	$7,913,118

Table 4-5: FY 13 O&M Costs for Year-round Operations

It was determined that a fair annual rate of inflation for operations and maintenance cost for the Flint WTP plant should be 4.51%. The 4.51% is an average of Lansing, Grand Rapids and Saginaw facilities.

5. CAPITAL REQUIREMENTS

Large capital investments would be required by Flint and GCDC to construct the KWA supply system. Furthermore, some of the options presented by DWSD (supply point from Imlay) would require the purchase by Flint of DWSD's 72-inch water main. Performing the financial analysis; therefore, required an analysis of the KWA construction cost estimate for the transmission system and Flint WTP improvements.

Revenue bonds were also identified as the source of financing the new supply system and associated improvements. This section describes the assumptions made and the interest used for financing the improvements.

KWA Supply System

The most current cost estimate of the KWA system was presented in the document titled; Lake Huron Supply Study, KWA, Appendix 20, October 2012 Preliminary Report Update, Final Report (DRAFT), October 4, 2012. The cost of construction is estimated at $272,421,558. Flint's portion would be 30% or $81,726,467.

Due to the significance of this expenditure, a detailed review of the cost was performed and is presented in this section. The analysis was performed based on the main elements of the supply system: the lake intake, the two pumping stations, and the transmission pipeline. Additionally, an analysis was performed related to construction contingencies and other costs such as engineering, legal, and administration.

Lake Intake

KWA representatives indicated in a meeting in November that the design documents for the intake were at 90% and that it was planned for advertisement in January 2013. A summary of the estimate is shown in Table 5-1.

Description	Estimate
Intake and Crib	$22,076,850
ELAC at 25%	5,519,213
Property	2,300,000
Total	**$29,896,063**

Table 5-1: KWA Intake Cost Estimate

Based on the evaluation, it appeared that the cost estimate was reasonable. Given that the design was nearly complete, the engineering, legal, administration, and construction contingencies (ELAC) at 25% were also found to be appropriate.

Pumping Stations

KWA representatives indicated that the pump stations were estimated at a level of design less than 15%. Therefore, in addition to an evaluation of their cost estimate, other water pumping station costs were used for comparison. Additionally, contractors were also contacted for costs. Table 5-2 summarizes the KWA cost estimate compared to our cost estimate performed for the Treasury.

Description	KWA	Estimate	TYJT	Estimate
Pumping Stations		$24,618,080		$54,573,314
Land for Intermediate Pump Station and Reservoir		--		75,000
Subtotal		$24,618,080		$54,648,314
ELAC for Construction	25%	6,154,520	30%	16,394,494
Total		**$30,772,600**		**$71,042,808**

Table 5-2: Pumping Stations Cost Estimate

Two things to note regarding the difference in the cost estimates; firstly, there is a large difference in the cost estimates of the pumping stations. The estimate developed for the Treasury used several other pumping stations construction costs from Southeastern Michigan and discussions with contractors. These costs were then computed on a $/MG's for comparison.

Secondly, our estimate for the Treasury is based on an ELAC of 30% instead of KWA's 25%. Although 25% was acceptable for the intake, it is believed to be too low for the pumping station estimate given that the engineering effort is less than 15%.

Transmission Main

Although the specific route for the transmission main was not provided, an estimate was calculated based on the general information provided. Once again, the KWA estimate was based on a level of design less than 15%. The estimate performed for the Treasury used the line items provided by KWA for the pipeline and also consulted with contractors to evaluate the cost of construction. The comparison is shown in Table 5-3.

Although the cost of construction of the pipeline is similar, a value of 30% was used for ELAC due to the level of design. Additionally, KWA did not believe there would be any additional costs for easements; however, this did not seem practical. Therefore an estimate for acquiring the easements was added to the Treasury estimate and is based on the 277 easements identified by KWA. The cost shown includes surveying, legal, engineering, administration, etc.

Description	KWA	Estimate	TYJT	Estimate
Transmission Mains		$166,202,316		$167,419,530
ELAC for Construction	25%	41,550,579	30%	50,225,859
Subtotal		$207,752,895		$217,645,389
Easements		--		1,166,170
Total		**$207,752,895**		**$218,811,559**

Table 5-3: Transmission Pipeline Cost Estimate

Other KWA Costs

In prior estimates of the construction cost, KWA used an ELAC of 37%. In this case it could be considered that the engineering effort associated with the design would have been included. However, it is believed that KWA's reduced ELAC of 25%, does not include the design effort. Additionally, it would be prudent to assume that the owner would want a construction manager during construction of this large project. A summary of these costs are shown in Table 5-4.

Description	Estimate
Design Engineering for Pumping Stations and the Transmission Pipeline	$16,939,581
Construction Management at 5%of Project Cost Estimate of $217,645,389	14,434,609
Administration	349,440
Legal, Easements, Contract Documents	831,000
Total	**$32,554,630**

Table 5-4: Other Costs

Summary Comparison

A summary of the two cost estimates are shown in Table 5-5. Based on the comparison, the estimate performed by TYJT shows a higher cost to Flint by approximately $25,000,000.

Note that there are two other costs shown in the summary that were not previously addressed; power and backup power. Regarding the cost of providing power to the pumping facilities, the cost of $4,000,000 appears reasonable.

The KWA has repeatedly indicated that backup power is not needed. Backup power is a standard practice in the water industry. Furthermore, a loss of power at either pumping facility will prevent the supply of water to both Flint and Genesee County. For these reasons, the cost of providing backup power was included in our estimate for the Treasury.

Description	KWA Estimate	TY/T Estimate
Intake/Crib	$ 27,596,063	$ 27,596,063
Pump Stations	30,772,600	71,042,808
Transmission Mains	207,752,895	217,645,389
Power	4,000,000	4,000,000
Redundant Power for PS		1,273,200
Land for Lake Huron Pumping Station	2,300,000	2,300,000
Design Engineering/PS and Transmission		16,939,581
Construction Management		14,434,410
Administration		349,440
Legal/Easement/Contract Documents		831,000
Easements		1,166,170
Total	**$ 272,421,558**	**$ 357,578,060**
Flint Share at 30%	**$81,726,467**	**$107,273,418**

Table 5-5: Total Cost Comparison

Flint WTP Improvements

The KWA analysis identified capital costs required to convert the existing WTP from river water treatment to treating lake water. The cost estimate was identified as $7,100,000 in the 2009 report. This number was used in the our analysis, since additional information was not provided. For the purpose of the financial analysis; however, the $7,100,000 was increased by 3% each year for three years to account for inflation.

DWSD Imlay Station Supply Options

The options identified by DWSD to supply service to Flint at the Imlay Pump Station would require Flint to purchase the 72-inch water main from Imlay to Master Meter, FL-1. The pipeline is approximately 25 miles long. The estimated cost provided by DWSD for estimating purposes is $4,700,000.

Financing

The cost of financing the revenue bonds for the capital work was investigated. Based on conversations with local financial advisors knowledgeable in bond financing, an interest rate of 5% for the 25 year

period was considered acceptable. This is based on a Standard and Poor's bond rating of A without insurance.

Additional costs associated with the bond include the reserve and bond issuance fee. The bond holders will require a reserve of approximately 10% of the loan to be held for the 25 year payment period. The cost associated with the bond issuance has been estimated at 2.25% of the principal borrowed for the KWA project and 3% for the smaller loan associated with the Flint WTP improvements or the purchase of the 72-inch main.

Furthermore, since no revenue will be generated to pay on the bonds for the first three years that the system is being constructed, the cost associated with capitalizing the interest was also included.

Finally, interest on the reserve will be provided back to KWA and Flint. Although the interest is currently less than 1%, it was determined that a 3% rate would be more prudent long-term.

6. FINDINGS

Using the information described in the previous sections, a cost evaluation was conducted for the KWA supply and the DWSD options. Individual worksheets for each option are provided in Appendix B. For the purpose of comparison a 30 year period was used. This period includes the 3 year construction period, the 25 loan period and an additional two years to get a sense of the cost of operation after the loans have been paid.

There were three separate cost sheets prepared for the KWA option. The first cost sheet (KWA) is based on the cost estimate provided by KWA. The costs provided assumed no overruns or delay in construction. With KWA's own assumptions of an overrun in construction of 15% and a one year delay in operations, the KWA estimated cost becomes $686,375,920 through Year 2042.

Since this cost estimate did not appear to include the financing of revenue bonds, another cost sheet (KWA-1) was developed that included KWA's cost estimate without overruns with the additional finance costs associated with the revenue bonds. A final cost sheet (KWA-2) includes the cost associated with the revenue bonds based on the estimate provided by TYJT for the Treasury.

A summary of the cost sheets provided in Appendix B are shown in Table 6-1. Figure 6-1 shows the cumulative annual costs associated with each option.

Option	Costs through 2042 ($)	Ranking by Cost
DWSD 8 MGD Maximum Day at Imlay Station	634,795,488	1
KWA *(10/31/12 No Overruns, As Provided)**	649,775,166	2
DWSD 8 MGD Maximum Day at FL-1	672,671,705	3
KWA-1 *(10/31/12 No Overruns with Cost of Financing)*	707,279,715	4
DWSD 12 MGD Maximum Day at Imlay Station	725,576,803	5
DWSD 12 MGD Maximum Day at FL-1	762,110,308	6
KWA-2 *(Treasury Estimate)*	766,784,313	7
DWSD 18 MGD Maximum Day at FL-1	821,226,268	8

* $686,375,920 with 15% overrun in construction and a one year delay in operations

Table 6-1: Total Cost of Options through 2042

Based on the analysis, it is prudent to assume the KWA water supply option costs would be somewhere between the KWA-1 and KWA-2 options. Therefore, the analysis indicates that the two DWSD options of supplying 8 MGD on a maximum day and up to 8 MGD on average are the least cost options for Flint. These options allow Flint to maximize the use of existing assets; the City of Flint's (the Flint WTP) and DWSD's (the existing 72-inch main).

Additionally, in recent conversations with the Treasury another option was discussed that could potentially be the most cost-effective solution. Currently the Flint WTP serves as a backup if service is

lost through either the DWSD or KWA pipeline. If the a twin pipe paralleling the DWSD 72-inch water main were constructed with interconnects with the 72-inch line, then the new water main could serve as the backup to Flint and the Flint WTP could be abandoned or potentially sold to Genesee County for their use.

The construction of the parallel pipeline would be considered in the DWSD capital expenditure as a Common to All (CTA) cost. This means that the capital cost of the pipeline would be shared by all DWSD customers and not just by Flint. Preliminary analysis of this option appears to be the most cost-effective of all the options discussed. However, a more thorough cost analysis is warranted and this approach would require an agreement between Flint and DWSD.

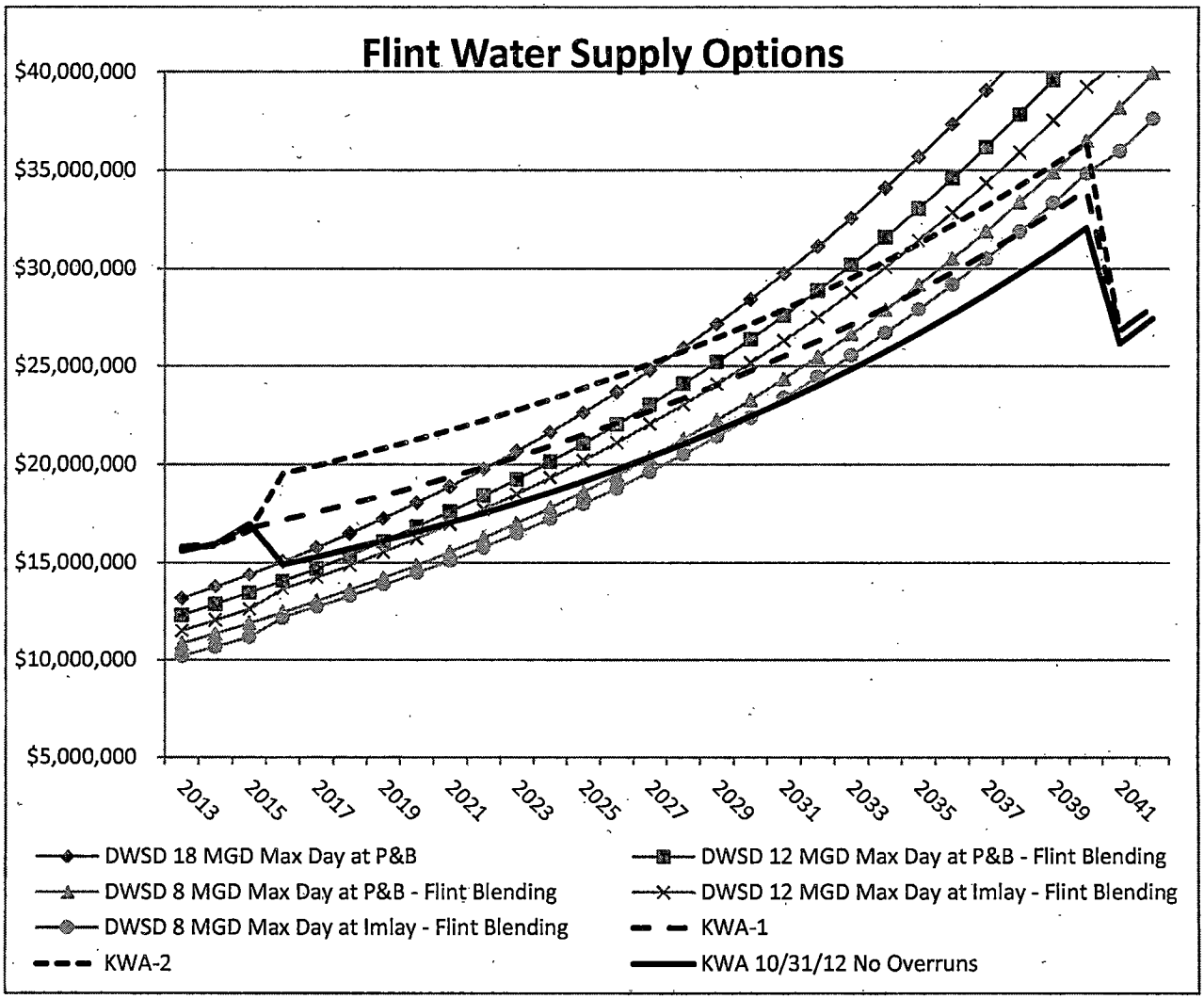


Figure 6-1: Flint Water Supply Options through 2042

Judge orders Flint to cut water rates 35 percent in sweeping injunction

Genesee Circuit Judge Archie Hayman issues Flint water ruling

Genesee Circuit Court Judge Archie Hayman makes ruling in Flint water case.

Ron Fonger | rfonger1@mlive.com By **Ron Fonger | rfonger1@mlive.com**
on August 07, 2015 at 5:25 PM, updated August 07, 2015 at 5:26 PM

(This story has been updated with additional information.)

Attorney Val Washington speaks and holds up a folder containing documentation of all Flint residences that have had liens placed against their properties due to delinquent water and sewer bills after increased fees went into effect in 2011.

Flint Journal file photo

FLINT, MI -- Less than four months after the city's financial emergency ended, a judge's order has city officials talking about a potential bankruptcy all over again.

The city of Flint has been ordered to roll back water and sewer rates by **35 percent**, to end a ready-to-service fee, to repay its water and sewer fund by more than $15 million, and to stop water disconnections and liens for past-due bills effective immediately.

Genesee Circuit Judge Archie Hayman issued an emergency injunction today, Aug. 7, a decision city officials said has the potential to bankrupt Flint, which just emerged from a financial emergency in April.

Hayman said the city wrongfully transferred $15.7 million in water and sewer funds in 2007 to help settle a lawsuit involving sewage overflows -- money that must be returned, but told attorneys for two Flint water customers and the city to negotiate the terms of that payback.

"I am mindful that this could be devastating to the city so the court is not going to at this point make a ruling that the $15.7 million has to be paid immediately ... but that money has to be replaced at some point," Hayman said.

The city issued a statement from City Attorney Peter Bade today, saying the ruling "is striking in terms of both its deviation from Michigan law, as well as the immediate financial harm it will cause the City of Flint.

"This will have a devastating financial impact," Bade's statement says. "The City will immediately seek a stay of this order and review by the Court of Appeals."

City spokesman Jason Lorenz said the city would have no further comment on the case today, but Mayor Dayne Walling released a statement, saying, "Flint needs a sustainable water system with affordable rates

and that is my objective. There are numerous problems with the judge's ruling that will be addressed through further court action."

Anthony Chubb, deputy chief legal officer for the city, asked Hayman for a stay in enforcing his ruling as the city appeals it to the state Court of Appeals, but the judge denied that request.

Chubb argued in court today that the requested injunction amounted to "a good political show" and said the ruling -- if it stands -- "would likely result in bankruptcy" for the city.

In issuing the injunction -- part of a lawsuit filed by two Flint water customers -- Hayman also:

- Told the city to eliminate a 35 percent increase in water and sewer rates enacted by Mayor Dayne Walling in 2011 because the hikes violated a city ordinance that required advance notice to customers and that requires such rate increases to be added over 12 months rather than immediately.

  Hayman said the state Court of Appeals also concluded former emergency manager Mike Brown did not have the authority to ratify Walling's water and sewer rate increases when that court issued an opinion in a related **lawsuit brought by City Councilman Scott Kincaid**.

  In June, the Court of Appeals reversed a decision by Genesee County Circuit Judge Richard Yuille, who dismissed the Kincaid lawsuit in 2013.

  That case is still pending in Circuit Court.

- Enjoined the city from collecting readiness-to-service fees until it complies with a city ordinance, requiring officials to justify those charges in writing.

  Hayman said the fees -- which amount to a $57.38 fixed charge for a typical residential customer -- can be collected but not without the city taking that step.

  City officials have said those fixed charges support maintenance of the water and sewer systems.

- Enjoined the city from enforcement of water liens and water disconnections because of past-due bills.

  Attorney attorney Val Washington said liens have been filed against more than 13,000 homes and businesses in Flint based on "illegal water rates."

- Ordered attorneys for the city to negotiate with Washington on how to pay back $15.7 million that was "wrongfully taken" from water and sewer funds.

"There's no ordinance that allows for that," Hayman said. "State law does not allow for that. The mayor at the time did not have the authority to go in and invade the water supply account."

Flint's mayor at the time of the transfer was Don Williamson.

Hayman told attorneys to work toward a plan for payback of the $15.7 million to the water and sewer fund by the end of October -- before returning to court Nov. 13.

Washington said the city has been unwilling to negotiate a settlement of the lawsuit, which was filed by Flint residents Larry Shears and Margaret Fralick in 2014.

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CITY OF FLINT

Dayne Walling
Mayor

January 18, 2015

The Honorable Rick Snyder
Governor, State of Michigan
P.O. Box 30013
Lansing, MI 48909

RE: Flint Water Improvement Plan

Dear Governor Snyder:

On behalf of the Flint community, I am writing to convey serious concerns about water quality and to request your support for my proposed Flint Water Improvement Plan. Access to safe and clean water is a basic human right, and, therefore, policy and budget decisions need to ensure that water is affordable and secure for everyone in Flint and all across Michigan. It is essential there is City, State and Federal cooperation to address the challenges here and to meet the needs of vulnerable populations.

The Flint Water Improvement Plan is focused in five areas: safety, quality, access, investment and education. The plan puts safety and quality first because this is fundamental. It is designed to be a sustainable solution for the City of Flint and the community as we move towards a new permanent water supply from Lake Huron through the Karegnondi Water Authority. My plan offers new ideas and also builds on successful models of utility, energy and assistance programs at the State and Federal levels.

Safety & Quality

- 100% Safety is the standard
- City of Flint reports testing data to the public to assure safety and expands testing sites and frequency
- Bring on experienced river water treatment operational management in the City of Flint

Access

- Announce an amnesty program for Flint water service turn-ons and reduce the turn-on fee
- Develop a revised affordable payment plan policy to encourage customers to return
- Design Federal and State partnership to establish new Drinking Water Emergency Assistance Fund for the elderly and vulnerable families

Investment

- Accelerate water system improvements outlined in the City of Flint Capital Improvement Plan through Federal and State investments
    - State approves City of Flint's Distressed Cities Fund applications

- Federal and State support for replacement or forgiveness of payment to the Drinking Water Revolving Loan Fund due to Flint's status as a distressed community
- Federal and State grants for infrastructure improvements in alignment with the Flint Master Plan

- City Water Department implements budgeted FY15 projects including leak detection, valve repairs, new pipes and meter replacements

Education

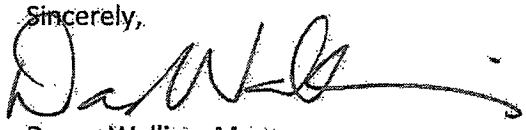
- Develop a community partnership with universities to provide household and business customers with information on testing and conservation
- Ongoing partnership with Michigan Department of Human Services, United Way, Salvation Army and community organizations to provide information and water assistance with the Keep the Water Flowing Fund and support services
- Expand youth energy initiative to assist households with conservation and efficiency (piloted in summer 2014 with Northwestern High School students, EcoWorks and Consumers Energy)

It is also critical to restore the public confidence in Flint Water. The implementation of this plan must be accompanied by extensive community engagement including local elected officials. My objective is to work with you and your appointed officials, State Senator Ananich, State Representatives Phelps and Neeley, Congressman Kildee, community groups, businesses, churches, foundations, the Flint City Council, and all of the City of Flint and government personnel.

It is imperative that we communicate better and provide residents more information. I understand representatives from the Michigan Department of Environmental Quality will be joining a public forum this week at City Hall. This engagement going forward is vital so thank you for supporting their efforts. I think this issue of transparency is important for communities all across the State. I recommend a review of the applicable laws and policies and, at a minimum, a new requirement that water testing data be reported publicly no less than quarterly by law in all Michigan communities in Flint's population category.

Thank you for the consideration Governor. There is nothing more important in Flint right now than fixing the water problems. We must work together to identify funds to repair and update the water treatment facilities and city-wide infrastructure and to help those persons without access to clean water so that the entire Flint community has sustainable, safe, secure and affordable water now and into the future. This is an important issue for the state of our State of Michigan and I urge you to work with us to implement solutions.

Sincerely,



Dayne Walling, Mayor
City of Flint

CC: Flint City Council President Joshua Freeman; Congressman Dan Kildee; State Senator Jim Ananich; State Representative Sheldon Neeley; State Representative Phil Phelps; Flint Emergency Manager Jerry Ambrose

Karegnondi Water Authority®

4610 Beecher Road Flint, Michigan 48532-2617
Phone (810) 732-7870 Fax (810) 732-9773

17,054

June 10, 2013

The Honorable Rick Snyder
Governor
State of Michigan
P.O. Box 30013
Lansing, MI 48909

Dear The Honorable Rick Snyder:

As the Karegnondi Pipeline project moves forward, I am excited to announce that we will be having an official groundbreaking for the project on June 28th. This represents a historic milestone, not only for the region, but for the entire state.

We will be holding the ceremony at the site where the intake will be built, near Port Huron. Details of the event are attached. While most people will drive themselves to enjoy the scenic view, we will be providing a bus to and from Genesee County with a LIMITED number of seats available. If you would like a spot on the bus you MUST **pre-register with my office prior to June 17th.** Seats will be first come first serve. Please call 810-701-6514 to pre-register. Please also note that this is a construction site, so casual dress should be used.

I realize this project has been decades in the making, and there are many individuals who have sacrificed much of their time to ensure that this day arrived. I truly hope that you are able to attend so that we may thank you and others for all of their hard work in seeing that the pipeline reached fruition.

The KWA is a game changer for our residents, and Michigan's economy overall. These days unfortunately come along much too infrequently. I hope to see you there so that we may celebrate our success together.

Regards,

JEFF

Jeff Wright
CEO – Karegnondi Water Authority

YOUR DOING A GOOD JOB GOVEROR! HOPE YOU COULD MAKE IT, AND SAY A FEW WORDS TO KICK THIS OFF.

Karegnondi Water Pipeline

Ground Breaking Ceremony

Please join us as we begin construction of the Karegnondi Waterline, taking the next step in water independence for our region!

Jeff Wright—Genesee County Drain Commissioner, cordially invites you to this historic groundbreaking ceremony.

After the conclusion of the program—Snacks and refreshments will be served.

Due to the distance of the construction site and limited parking , a bus will be provided leaving the Genesee County area at 8:00 a.m. **Deadline to RSVP for bus is June 17th.
(Seats will be first come first serve through pre-registration. You will receive further details at that point.) - **Bus is scheduled to return at 3:00 p.m.**

June 28th

10:00 a.m.

3900 Fisher Rd.
Lexington, MI

(see attached map)

- Please RSVP for **BOTH** attendance and transportation prior to **June 17th.**

Please RSVP to Kevin Sylvester at
810-701-6514
ksylvester@gcdcwws.com

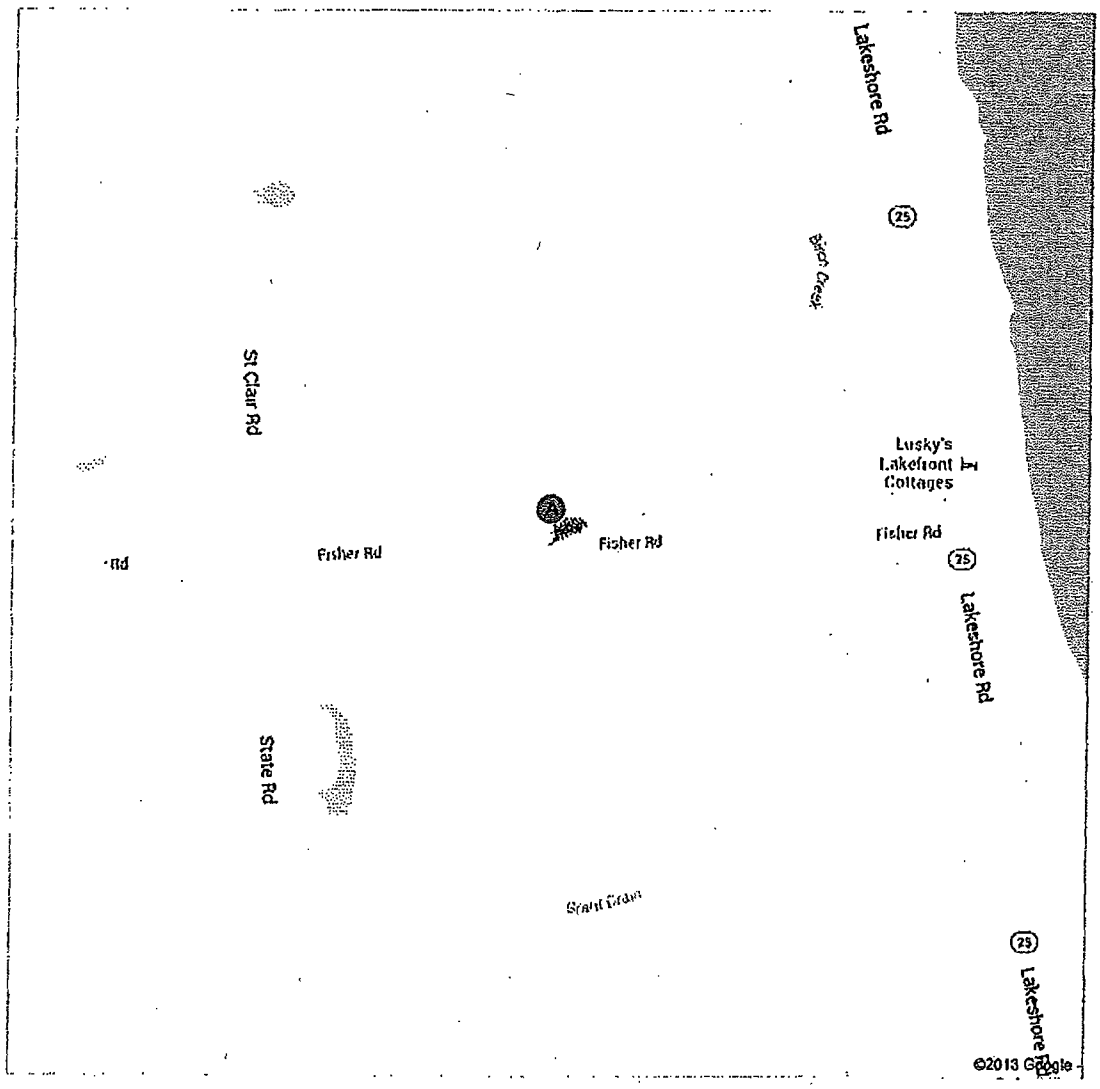
For Questions Please Contact:

Kevin Sylvester
Communications Director
Genesee County Drain Commissioner's Office
810-701-6514
ksylvester@gcdcwws.com

Google

Address 3900 Fisher Rd
Lexington, MI 48450

Corner of Fisher Road and M-25



Program Agenda

10:00 a.m.—Introduction/Welcome .....Jeff Wright
Genesee County Drain Commissioner

10:05 a.m.—Invocation – .....Pastor Floyd Fuller
Mount Tabor Missionary Baptist Church

10:10 a.m.—Overview of Project .....Jeff Wright

10:30 a.m.—Key Stakeholders

Rick Hammel—Former Democratic House Leader

Jamie Curtis—Chair, Genesee County Board of Commissioners

Dayne Walling—Mayor, City of Flint

Nancy Nyquist—Department of Agriculture

Steven Busch—Department of Environmental Quality

Liane Shekter Smith—Department of Environmental Quality

Charles Smiley—State Representative

Pam Faris—State Representative

Kevin Daly—State Representative

David McGhee—Congressman Dan Kildee

Bryanna McGarry—State Senator Jim Ananich

Kevin Gardner—State Senator Phil Pavlov

Janice Karcher—Genesee Regional Chamber of Commerce

Greg Alexander—Sanilac County Drain Commissioner

11:15 a.m.—Official Groundbreaking of Karegnondi Pipeline

11:30 a.m.—Lunch will be served

1:00 p.m.—Ceremony Concludes—Have a safe trip home!!

Business and Community Groups
Working Together to Support KWA!!

Michigan Agri-Business Association
Genesee County Farm Bureau
Lapeer County Farm Bureau
Sanilac County Farm Bureau
St. Clair County Farm Bureau

UAW Region 1C – Norwood Jewell
Michigan Building Trades

Flint River Watershed Coalition
Holloway Reservoir Homeowner's Association
Sierra Club

McLaren Regional Medical Center

Dee Cramer
DTE
Diplomat Pharmacy
Goyette Mechanical Company
Koegel Meats
Landaal Packaging Systems
Management Diversified, Inc.
Merrill Lynch
Security Packaging
Walker Electric
Weinstein Electric

Eastside Business Association
Genesee Regional Chamber of Commerce



Special Thanks to the Following……This day would not be happening without them:

Genesee County Water and Waste Advisory Committee Members:

Robert Cole, Argentine Township, Chairman

Barbara BakerOmerod, Village of Lennon
Marsha Binelli, Flint Township
Rian Birchmeier, Flushing Township
Ed Brown, City of Davison
Rick Caruso, Clayton Township
Mark Emmendorfer, Montrose Township
Scott Fairbanks, City of Linden
Steven Fuhr, Genesee Township
Larry Green, Mt. Morris Township
Marilyn Hoffman, Grand Blanc Township
C. Dana Horn, Venice Township
Brian Jonckheere, Livingston County
Shirley Kauffman-Jones, Atlas Township
Eileen Kerr, Thetford Township
William Kovl, City of Clio
Joseph Madore, Richfield Township
Bonnie Mathis, Fenton Township
Chuck Melki, Gaines Township
Dave Miller, Genesee Co. Road Commission
Paul Moore, Village of Birch Run
Bill Nelson, Birch Run Township
Diane Nowak, Village of Gaines
Joe Oskey, Mundy Township
Robert Palmer, Vienna Township
Everett Persall, City of Montrose
Mary Ann Price, Forest Township
Jeff Roth, City of Mt. Morris
Jakki Sidge, Village of Goodrich
Tom Svicek, City of Swartz Creek
Paula Zelenko, City of Burton

Karegnondi Water Authority Incorporating Board Members:

Dayne Walling, Board Chair, City of Flint
Jamie Curtis, Board Member, Genesee County Board of Commissioners
Jeff Wright, CEO, Genesee County Drain Commissioner
Greg Alexander, Vice Chair, Sanilac County Drain Commissioner
Joe Sluma, Board Member, Lapeer County Drain Commissioner
Dale Kerbyson, Board Member, City of Lapeer
Retired KWA Members: Delrico Loyd, Amy Planck, John Freeman

Board of Commissioners

Genesee County
Jamie Curtis
Omar Sims
Brenda Clack
John Northrup
Mark Young
Tony Brown
Archie Bailey
Ted Henry
Pegge Adams

Sanilac County
Daniel Dean
Justin Faber
John Hoffmann
James Ruby
Donald Hunt

Lapeer County
Cheryl Clark
Gary Roy
Dyle Henning
Lenny Schneider
Dave Eady
Linda Jarvis
C. Ian Kempf

Flint City Council

Scott Kincaid
Claudia Croom
Jacqueline Poplar
Bryant Nolden
Josh Freeman
Bernard Lawler
Sheldon Neeley
Dale Weighill
Michael Sargusson

Ed Kurtz, Flint Emergency Manager

Karegnondi Water Authority

Pipeline Groundbreaking Ceremony

June 28th 2013

Dawn of a New Era



The Future is Now……

A new start for our region!

4425 (Rev. 04-15)

STATE OF MICHIGAN
DEPARTMENT OF TREASURY
LANSING

RICK SNYDER
GOVERNOR

NICK A. KHOURI
STATE TREASURER

Flint Water Timeline (11-09-15)

1. **June 26, 2012** – Letter from Flint EM Mike Brown to DWSD for permission to begin blending Flint River water with treated water from DWSD. The letter indicates that the DEQ is supporting this option and its implementation would save the City between $2M and $3M annually.

2. **September 20, 2012** – Letter from Flint EM Ed Kurtz to DWSD requesting written permission to implement the blending option. Approval is requested by October 1, 2012.

3. **October 31, 2012** – Analysis by the Flint Finance Director suggests that the annual cost to purchase water from DWSD will steadily increase to $23M per year by fiscal year 2020.

4. **November 2012** – Treasury retains Tucker, Young, Jackson and Tull (TYJT) to evaluate the KWA proposal to the City of Flint.

5. **November 6, 2012** – Letter from Flint Emergency Manager Ed Kurtz to State Treasurer Dillon that a proposal from DWSD is expected but that the initial assessment is that switching to KWA is in the best interest of the City of Flint.

6. **February 6, 2013** – TYJT issues a final report to Treasury on the comparison between Karegnondi Water Authority (KWA) and DWSD. Analysis suggests that the KWA option is the cheaper option for the City of Flint.

7. **March 2013** – DWSD contacts the City of Flint to begin direct negotiations on a contract extension. Multiple options are provided to the Flint Emergency Manager (EM) Ed Kurtz.

8. **March 25, 2013** – The Flint City Council endorses joining KWA.

9. **April 11, 2013** – State Treasurer Andy Dillon authorizes Flint EM Ed Kurtz, pursuant to Section 12(3) of P.A. 436 of 2012, to enter into a contract with KWA if a final offer from DWSD is either not received for rejected in good faith based upon specific objections.

10. **April 15, 2013** – DWSD provides a best and final offer to the City of Flint. Analyses by Flint EM Ed Kurtz, the Department of Environmental Quality and Treasury's Office of Fiscal Responsibility independently conclude that the KWA option is cheaper for the City of Flint.

November 24, 2015

Michigan Department of Environmental Quality
City of Flint Drinking Water Event Timeline
Q&A

I. INTRODUCTION

This document is intended to provide an overview of Michigan's implementation of the Safe Drinking Water Act, 1976 PA 399, as amended (Act 399), with respect to events in the city of Flint (City), Michigan.

II. BACKGROUND

1. How has Flint historically obtained its drinking water?

The water system in the City was organized and built under private ownership in 1883 as the Flint Water Works Company to pump raw water from the Flint River to their consumers. In 1903, the system was converted to a municipally-owned corporation which supplied drinking water to the City. In 1967, the City became a customer of the Detroit Water and Sewerage Department (DWSD) system.

After the switch to DWSD, the City operated its water treatment plant as a standby plant for purposes of reliability in the event of an emergency, such as an interruption in service of the single pipeline from DWSD. In the last ten years, the water treatment plant was used as an emergency backup during two weeks in 2009: June 18 through June 20 and September 10 through September 13.

As a backup emergency water treatment plant, the City was required to operate the water treatment plant quarterly to demonstrate the capability to produce drinking water in accordance with Act 399 and to keep mechanical equipment (such as valves, rubber seals, etc.) in good working order. Each quarter, the water treatment plant was test run and samples were taken of both raw water and finished water (post-filters). Since the water treatment plant was upgraded in the early 2000s, monitoring showed that the water treatment plant was performing as designed.

Contractual obligations with DWSD did not allow treated water to be put into the City's distribution system during these test runs. Treated water was discharged to the Flint River in accordance with a National Pollutant Discharge Elimination System (NPDES) Permit. The test runs were for demonstration purposes, to keep the water treatment plant operational, and staff familiar with operation in the event it was needed in an emergency.

2. What State and Federal laws or rules exist to ensure safe drinking water is provided to City residents?

The federal Safe Drinking Water Act (federal SDWA) is the primary law that ensures the quality of Americans' drinking water. Under the federal SDWA, the United States Environmental Protection Agency (USEPA) sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards.
The federal SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended

The DEQ engages in a variety of activities to help water systems remain in, or return to, compliance. These activities include: conducting surveillance visits (inspections) at water systems and reviewing facilities, equipment, and operations; requiring the submission of plans and specifications for waterworks system improvements and issuing construction permits; providing for the training, examination, certification and regulation of persons operating water supplies; helping systems incorporate preventive measures; and since 1996, providing financial assistance for system improvements.

5. What is the City's role in implementing the federal SDWA and Act 399?

State and federal programs develop regulations and perform oversight and compliance activities, but do not treat or deliver water to customers. At the local level, public and private water utilities collect, treat, and deliver drinking water to consumers in compliance with state and federal regulations.

The federal SDWA and Act 399 set up multiple barriers against contamination. These barriers include: source water protection, multiple treatment components, distribution system integrity, proper operations oversight, and public information. As the owner of a public water system, the City is responsible for knowing and following all requirements under Act 399, such as ensuring proper design, construction, operations and maintenance, so that contaminants in tap water do not exceed the standards established by law. The City treats the water, and must test its water routinely for specified contaminants and report the results to the DEQ. If a water system is not meeting these standards, it is the water supplier's responsibility to notify its customers.

The federal SDWA and Act 399 recognize that customers have the right to know what is in their drinking water and where it comes from. The City, like all water suppliers, must notify consumers when there is a problem with water quality.

The City submits samples of its water for laboratory testing (monitoring) to verify the water it provides to residents meets all federal and state standards. How often and where samples are taken varies from system to system and from contaminant to contaminant. The DEQ provides an annual monitoring schedule to the City setting forth these requirements.

In addition, the City is required to employ properly certified water operators that are trained and experienced to operate the treatment and distribution systems associated with the City's water system.

6. What approvals were needed from the DEQ in order for the City to begin using its water treatment plant full time?

The City had long ago been issued construction permits for raw water pumps to withdraw water from the Flint River and the City was grandfathered under the water withdrawal program (Part 327, Great Lakes Preservation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended), as were all existing community public water systems at that time. There were no additional DEQ permissions or authorizations required under Act 399 because the City already had approval to use the water treatment plant.

April 2014 (DWSD) average pH = 7.49 range: 7.42 – 7.59

Note that the pH of the treated water produced while the City was using the Flint River did not differ significantly from pH values seen in the distribution system during the time the City purchased water from DWSD. Thus, pH monitoring provided no indication of a change in water corrosivity.

IV. *E. COLI* AND TOTAL COLIFORM BACTERIA VIOLATIONS

1. What caused the *E. coli* and total coliform bacteria violations experienced by the City in August and September 2014?

A number of factors, primarily related to distribution system operation and maintenance, likely contributed to the Boil Water Advisories in the City during August and September 2014 triggered by exceedances of bacteria standards in limited areas of the distribution system. In addition, the coliform detections were confined to less than 20 percent of the water system. Had the detections been the result of a failure in treatment, detections would have been expected throughout the City rather than in such a limited geographic area.

Instead, the violations seem to have been caused by other factors such as aging infrastructure. The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of unlined cast iron piping. This cast iron pipe is subject to tuberculation, which thins and weakens the pipe walls in some areas and causes a buildup of sediment and debris on the pipe walls in other areas. Tuberculation can lead to water quality issues as well as reduced flows and pressures. Tuberculation also encourages the development of biofilms. Biofilm growth may occur more frequently in areas where little or no disinfectant is maintained.

The City has also experienced decades of a declining customer base and water use, with vacant homes, commercial businesses, and industrial property. Declining water use leads to excess residence time (water age) within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and reductions of disinfectant concentration in the distribution system. While the City has recently seen an infusion of funding for blight removal, contractors using fire hydrants to complete this work have been known to cause hydraulic disturbances that dislodge and suspend settled debris, which may contribute to the bacterial contamination. These hydraulic disturbances were also believed to be a source of the aesthetic water quality complaints both the City and the DEQ were receiving.

The winter of 2013-2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30 percent, saw even greater losses since February 2014 due to an increase in cold weather-related water main breaks and leaks (City personnel reported 400 water main breaks in calendar year 2014, with greater than 50 percent in the winter quarter). The City has also been lacking a formal maintenance program for its more than 7,250 valves, which are critical in limiting the areas impacted during water main repairs. As an example, two valves on the transmission line used to supply the area of the 2014 Boil Water Advisories were found to be closed during the City's

collected and analyzed to confirm that bacteria are no longer present. Under approved analytical methods used by the City, samples must be incubated for 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a Boil Water Advisory. Adding each of these steps together, a normal response period to rescind a Boil Water Advisory under these circumstances would be expected to take 3 to 4 days.

V. TOTAL TRIHALOMETHANES (TTHM) VIOLATIONS

1. What caused the TTHM violations experienced by the City beginning in late summer 2014?

Disinfectants are an essential element of drinking water treatment because of the barrier they provide against waterborne disease-causing microorganisms. However, disinfection byproducts form when disinfectants used to treat drinking water react with naturally occurring organic materials in the water (e.g., decomposing plant material). The formation of disinfection byproducts continues to occur as water travels throughout water distribution systems.

A major challenge for water suppliers is how to provide protection from pathogens while simultaneously minimizing health risks to the population from disinfection byproducts. Total Trihalomethanes (TTHM – chloroform, bromoform, bromodichloromethane, and dibromochloromethane) and halogenated acetic acids (HAA5 – monochloro-, dichloro-, trichloro-, monobromo-, dibromo-) are widely occurring classes of disinfection byproducts. The amount of TTHM and HAA5 in drinking water can change depending on the season, water temperature, amount of chlorine added, the amount of plant material in the water, and a variety of other factors. All community water systems that chemically disinfect or purchase water that has been chemically disinfected are required to monitor for disinfection byproducts.

The Flint River has higher levels of organic material than water in the Great Lakes and as a result, the water produced by the City developed higher disinfection byproducts than the water purchased from DWSD. Because the water treatment plant was previously operating intermittently, it was not possible to predict disinfection byproduct levels at distribution system compliance points until the City began relying on its water treatment plant continuously.

As mentioned previously, the City became aware that there were numerous broken valves and closed valves that should have been open in the distribution system. At that time, the City also began a mapping effort to identify "water age" in the distribution system. The longer the residence time or "water age" the greater the opportunity for the formation of disinfection byproducts.

2. How were the violations detected? What was the DEQ's response?

Disinfection byproducts are monitored at eight sites throughout the distribution system. A locational running annual average is calculated for each individual site. Because TTHM and HAA5 maximum contaminant levels are calculated based on a running annual average at specific distribution system locations, the actual violation

VII. LEAD ISSUES IN THE FLINT DRINKING WATER

1. What causes lead in drinking water?

Lead is rarely found in source water. Lead enters tap water through corrosion of plumbing materials. Homes built before 1986 are more likely to have lead fixtures and solder. Older homes built prior to World War II are more likely to contain lead pipes. The most common problem with newer construction is with brass or chrome-plated brass faucets and fixtures which can leach significant amounts of lead into the water, especially hot water. The amount of lead in tap water also depends on the types and amounts of minerals in the water, how long the water stays in the pipes, the amount of wear in the pipes, the pH of the water, and its temperature.

2. What is the Lead and Copper Rule?

On June 7, 1991, the USEPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR). The treatment technique for the rule requires systems to monitor drinking water at customer taps. If the 90th percentile for lead exceeds an action level of 15 parts per billion (ppb) or the 90th percentile for copper exceeds an action level of 1.3 parts per million (ppm), the system must undertake a number of additional actions to control corrosion. If the action level for lead is exceeded, the water supply must also inform the public about steps they should take to protect their health and the water supply may have to replace lead service lines under their control.

3. What is the lead action level?

For most contaminants, the USEPA sets an enforceable regulation called a maximum contaminant level based on the maximum contaminant level goal. Maximum contaminant levels are set as close to the maximum contaminant level goals as possible, considering cost, benefits, and the ability of public water systems to detect and remove contaminants at the water treatment plant using suitable treatment technologies. Because lead contamination of drinking water often results from corrosion of the plumbing materials belonging to water system customers, the USEPA established a treatment technique rather than a maximum contaminant level for lead. A treatment technique is an enforceable procedure or level of technological performance which water systems must follow to control a contaminant. Although the maximum contaminant level goal for lead is zero, based upon the above factors, the USEPA has established the action level for lead at 15 ppb.

The treatment technique regulation for lead requires water systems that produce drinking water to control the corrosivity of the water. The regulation also requires systems to collect customer tap samples from sites served by the system that are more likely to have plumbing materials containing lead. If the 90th percentile action level for lead is exceeded, then water systems are required to take additional actions including:

- Optimizing corrosion control treatment (for water systems serving greater than 50,000 people that have not fully optimized corrosion control).

Step 1: Place lead or copper results in ascending order
Step 2: Assign each sample a number, 1 for lowest value
Step 3: Multiply the total number of samples by 0.9 – this yields the 90th percentile sample. For example: 20 samples x 0.9 = 18th sample. This is the 90th percentile level.

Calculating the 90th percentile is easiest when a supply collects 10 samples (or a multiple of 10). Note that the 90th percentile must be interpolated if the number of samples is not a multiple of 10.

7. What was the result of the first round of monitoring conducted by the City?

The first 6-month round of lead and copper monitoring conducted by the City ended on December 31, 2014. One hundred samples were submitted and the 90th percentile lead level was calculated to be 6 ppb. The next step required by the DEQ was for the City to collect a second round of monitoring.

8. What was the result of the second round of monitoring conducted by the City?

The second 6-month round of lead and copper monitoring conducted by the City ended on June 30, 2015. Sixty-nine samples that complied with the site selection criteria were submitted and the 90th percentile lead level was calculated to be 11 ppb. The conclusion from these results was that the City, while in compliance with the action level, exceeded the level required to be deemed as having optimized corrosion control.

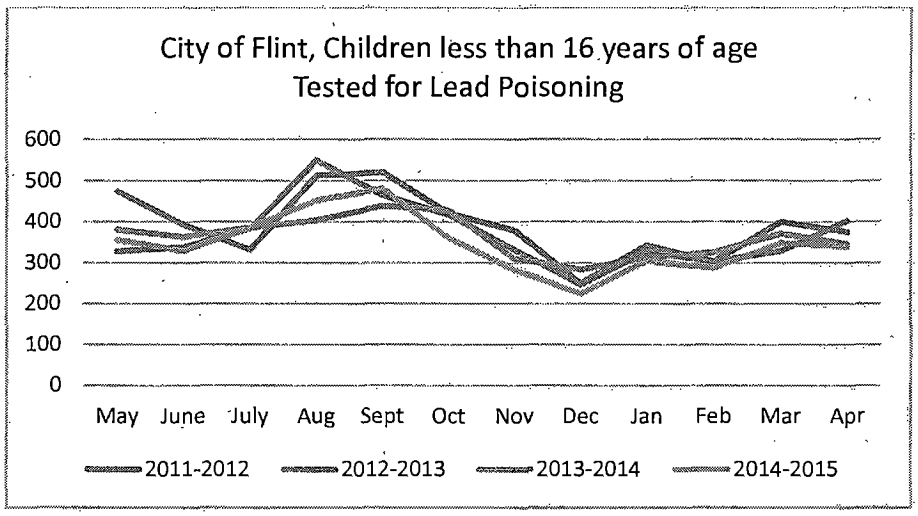
9. Why was the City required to collect 100 compliance samples for lead and copper in the first 6-month monitoring period of July through December of 2014 and then only 60 compliance samples in the second 6-month period of January through June of 2015?

The number of compliance samples required for lead and copper is based upon the population served by the water system as identified in the table below, taken from Rule 325.10710a of Act 399.

Supply Size (Number of People Served)	Number of Sites (Standard Monitoring)	Number of Sites (Reduced Monitoring)
More than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Fewer than 101	5	5

The number of samples the City was required to collect in the first round of monitoring after they began relying on the Flint River was based on the 2010 census, which listed the City's population as more than 100,000 residents. In March of 2015, the City provided updated information that indicated the City's population had decreased to less than 100,000. Therefore, they were only required to collect 60 samples. There is no rule prohibiting the collection of additional compliance samples – only establishing a minimum number necessary.

- There was a spike in elevated blood lead tests from July-September 2014...



- However, that pattern was not terribly different from what we saw in the previous three years; especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).

- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspected that the summer data spike may be related to this effect.

- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015."

This e-mail from DHHS in concert with the completion of two 6-month rounds of lead compliance sampling data indicating that the City had not exceeded an action level for lead provided the basis for the DEQ to maintain that the water in the City continued to be in compliance with the federal SDWA and Act 399.

12. When did the DEQ first become aware of allegations of elevated blood levels being detected in certain children?

The DEQ was notified on August 23, 2015, by a professor from Virginia Tech that "over the next few months we will be studying Flint water quality issues..." Results indicating elevated lead levels in homes were reported as part of this study in late August. In September 2015, information was reported in news articles that

plant ranges between 55 and 65 mg/l. It should be noted that the City uses ferric chloride as its primary coagulant, although this does not add a significant amount of chloride to the finished water.

4. Has the USEPA subsequently admitted that the LCR is subject to differing interpretations such as that presented by the DEQ?

Yes. On November 3, 2015, the USEPA issued a memorandum regarding the "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems". This memorandum addresses concerns raised about the application of the LCR, specifically the requirements pertaining to maintenance of optimal corrosion control treatment, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. The USEPA states that this type of situation rarely arises, that the language of the LCR does not specifically discuss such circumstances, and that there are differing possible interpretations of the LCR with respect to how the rule's optimal corrosion control treatment procedures apply to this situation. The memorandum is intended to clarify, on a prospective basis, steps agencies should take or apply in the future. USEPA's new guidance provides acknowledgement that the LCR is subject to differing interpretations. The DEQ's interpretation and application of the LCR in this situation was in compliance with the federal SDWA and Act 399.

5. Did the DEQ reject any of the samples submitted by the City?

Yes, samples at two locations were excluded from the compliance calculation in conformance with rules issued by the USEPA.

According to the LCR, compliance samples must be a first draw, 1-liter sample collected from a cold water, kitchen or bathroom tap after the tap has stood unused for not less than 6 hours. Federal and state rules require community public water systems to identify a pool of targeted high-risk sampling sites, called Tier 1 sampling sites. For a municipality such as the City, the Tier 1 sampling pool must consist of single family structures that are:

- served by a lead service line,
- contain lead pipes, or
- contain copper pipes soldered with lead installed after 1982 but before Michigan enacted the ban on solder containing high concentrations of lead (June, 1988).

As long as a community has Tier 1 sites that contain lead service lines, they are required to collect at least 50 percent of their compliance samples from these lead service line sites. Finally, federal and state rules specify that "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment devices include home softeners, iron filters, etc. Samples collected from multiple family residences, commercial buildings, institutional facilities, or single family structures with point-of-use or point-of-entry treatment can only be used if the community has insufficient Tier 1 sites available.

7. Did the DEQ believe the levels of lead found at 212 Browning in April 2015 were indicative of a system-wide problem?

High levels of lead were collected in samples taken from this residence. It was determined to be coming from an unusually long lead service line. For some reason, this home was not connected to the water main that ran in front of the house, but rather to a main located on a street several houses away. The City replaced the lead service line May 6, 2015. Since the internal plumbing of the house is plastic, it was believed that replacement of the lead service line would resolve the problem, and subsequent sampling taken at this address showed that replacement of the service line did mitigate the problem. There was, therefore, no reason to believe that this was indicative of a system-wide problem.

8. Do the DEQ's sampling instructions comply with the LCR?

The DEQ continues to seek official clarification from the USEPA regarding the sampling protocols. The DEQ's sampling recommendations were developed to ensure compliance with the USEPA's guidance provided in the preamble to their lead and copper regulations that said that household use should be "typical" for a residential customer on the day before sample collection for lead and copper. Early in the implementation of the LCR, the DEQ had encountered too many situations where compliance samples had been collected from kitchen and bathroom taps that had not been used in days and in some cases, even weeks, resulting in excessively stagnated water and correspondingly high lead levels that did not represent typical exposure expected after overnight stagnation. To incorporate these results into further regulatory decision making could have led to actions that were not indicative of a true public health threat. Further complicating this issue was the USEPA's direct implementation of the LCR in Washington, D.C., where it was learned that some "valid" lead results were not always being included in compliance calculations. Subsequently, the USEPA made invalidation of samples for any reason much more difficult. In order to ensure samples were taken at customer taps representative of typical use, the DEQ devised the current recommendations for ensuring appropriate but not excessive stagnation for LCR monitoring.

The DEQ continues to believe it is appropriate to ensure that taps being sampled are representative of typical household use and are sampled during the recommended stagnation period of 6-18 hours. The LCR does not say the result should represent the "absolute worst case" condition – it talks about sampling the highest risk locations (lead plumbing, lead service lines, high lead content solder piping, etc.) after overnight stagnation and then collecting a first draw sample so as not to flush elevated lead from that tap at that point in time. There are a number of other states that share the DEQ's interpretation of the rule and the DEQ encourages the USEPA to provide official clarification directed at all states with primacy.

Summary of Flint Water Date Timeline and Background Information

Overall

- The health and welfare of Flint residents is a top priority and Governor Snyder is committed to a coordinated approach with resources from state agencies to address all aspects of this situation.
- Governor Snyder has requested support from the Federal Emergency Management Agency (FEMA) to coordinate with other federal agencies to provide resources to Flint as we work on short-term and long-term solutions for residents.
- When Governor Snyder became aware that the city of Flint's water showed elevated lead levels and that the state's handling of the situation was being questioned, he requested funding to switch the source back to the Great Lakes Water Authority and appointed an independent task force to identify possible missteps and areas for improvement.
- On Jan. 11 Gov. Snyder created the Flint Water Interagency Coordinating Committee (FWIACC), which will bring together a wide range of experts to work on long-term solutions to the Flint water situation and ongoing public health concerns affecting residents. The FWIACC is made up of experts from government and the Flint community and will set a course of action to remedy the water situation and resulting health issues, and carry on long after the emergency declaration expires.
- The independent Flint Water Task Force is continuing a full review of all local, state and federal actions that led to the current situation in Flint. A detailed report will be released upon completion.

In response to initial findings from the Flint Water Task Force, Governor Rick Snyder accepted the resignation of the Director of the Michigan Department of Environmental Quality.

Here is a summary timeline of the Flint water events:

2006

January: Discussions regarding Karegnondi Water Authority start.

2013

March: Flint City Council votes 7-1 to join the Karengondi Water Authority.

April 16: City of Flint Emergency Manager Ed Kurtz signs agreement to switch from Detroit Water and Sewerage Department water source to KWA. (DWSD) DWSD sets termination of Flint water service for April 17, 2014.

April 17: DWSD said it will stop selling water to the City of Flint in April 2014.

June: Flint notifies the DEQ of intent to operate the Flint Water Treatment Plant full-time using Flint River for drinking water.

2014

Mid-March: City of Flint decides to use the Flint River as a water source.

April: DEQ issues Flint Water Treatment Plant construction permits for full-time operation enhancements.

April 25: City of Flint switches to Flint River water.

July: DEQ begins the first six-month Flint lead-copper monitoring report. Part of EPA corrosion control protocol.

October: GM stops using Flint water because of chloride levels.

December: First round of lead-copper monitoring results come back at 6 ppb.

2015

January 1: DEQ begins second six-month Flint lead/copper monitoring period.

January 12: DWSD offers the City of Flint a waiver of the $4 million reconnection fee to switch back to Detroit water.

February 26: The EPA discusses a resident's water sample testing results with the DEQ. High levels of lead were found in the water at the residence.

February 27: DEQ responded to the EPA saying that the Flint Water Treatment Plant has an optimized corrosion control program.

April 6: Flint proposes installation of Granular Activated Carbon Filter media to reduce disinfection byproducts. This was intended to reduce the discoloration and odor in the water.

April 24: DEQ indicates no corrosion chemical (orthophosphate) in place. DEQ staff ~~thought they~~ were following the EPA protocol for two six month testing periods (to end in July) ~~before it should be put in place~~.

May 28: Sample results from the residence noted with high lead levels on Feb. 26 show lead levels improved after a new copper service line installation.

July 28: Excerpt response from Childhood Lead Poisoning Prevention program head:

"We compared lead testing rates and lead testing results to the same time frame for the previous 3 years, to see if there were any patterns that suggested that there were increased rates of lead poisoning after the water supply was switched.

- Lead testing rates remained about the same from year to year
- There was a spike in elevated blood lead tests from July-September 2014
- However that pattern was not terribly different from what we saw in the previous three years, especially in 2011-2012 (we are working with our Epidemiologist to statistically verify any significant differences).
- We commonly see a 'seasonal effect' with lead, related to people opening and closing windows more often in the summer, which disturbs old deteriorating paint on the windows, sills and sashes. Window fans frequently blow and spread the lead dust from the deteriorating paint to other parts of the room/house. We suspect that the summer data spike may be related to this effect.
- If the home water supply lines and/or river water were contributing to elevated blood lead tests, we expected that the increased rates would extend beyond the summer, but they drop quite a bit from September to October, stayed low over the winter, and are just starting to tail up again in the spring of 2015.

"So upon review, we don't believe our data demonstrates an increase in lead poisoning rates that might be attributable to the change in water source for Flint. We recognize that lead exposure via the water is only a small piece of what may be happening for families in Flint, however, we hope the information is helpful."

August 4: Meeting with Governor's Office and Flint pastors.

August 17: DEQ notifies the Flint WTP of the second six-month lead/copper monitoring results that show lead levels at 11 ppb.

August 23: Virginia Tech researcher, Marc Edwards, notifies the DEQ that he will begin a study of the City of Flint water quality.

August 24: Dr. Mona Hanna Attisha from Hurley Hospital contacts Genesee County Health Department for blood lead level data/information.

August 28: Concerned Pastors announce water filter giveaway in Flint.

September 2: Virginia Tech researcher, Marc Edwards, indicates that the corrosiveness of the Flint water is causing lead to leach into the residents' water.

September 24: Hurley Medical Center study issued showing high blood lead levels in City of Flint Children.

September 25: Flint issues lead advisory regarding drinking water

September 29: Dr. Eden Wells, State Medical Officer, contacts Dr. Mona Hanna Attisha regarding her study results.

September 30: Briefing to Director Lyon comparing Lead Copper Rule Testing (EPA protocol) and Marc Edwards protocol.

October 1: Michigan Department of Health and Human Services confirms results of Hurley Medical Center Study.

October 1: MDHHS provides information for Flint Water website, including the following documents: Parent Handbook: Is Your Child Safe From Lead Poisoning, Blood Lead Level Quick Reference for Primary Care Providers, Lead Screening & Testing for Safe, Healthy Michigan Kids, and finally, Pregnant and Nursing Mothers: What You Need to Know.

October 1: City of Flint, Genesee County Health Department urge residents to not drink water and issues "Do Not Drink" Advisory .

October 2: MDHHS determines its study results are now consistent with Hurley findings, Gov. Snyder announces comprehensive action plan to address Flint water issues. State Budget Office approval to use carryover emergency funds and transfer of DEQ funds to purchase water filters.

October 2: Genesee County Health Department school screening water samples collected for analysis.

October 5: MDHHS announces water filters will be available to the public on Oct. 6.

October 7: Flint Technical Advisory Board meets, recommends reconnection to Detroit water.

October 8: Gov. Snyder conducts press conference in Flint, announces plan to reconnect to Detroit water.

October 8: City of Flint develops plan to reconnect to DWSD.

October 15: Gov. Snyder signs bill authorizing funding for Flint to move back to Detroit water system.

October 16: City of Flint reconnects to DWSD.

October 19: DEQ Director Dan Wyant states: "Staff made a mistake while working with the City of Flint. Simply stated, staff employed a federal (corrosion control) protocol they believed was appropriate and it was not."

October 21: Gov. Snyder announces Flint Water Task Force to review state, federal and municipal actions, offer recommendations.

October 28: DEQ issues construction permit for additional corrosion control treatment.

December 9: Flint begins adding supplemental corrosion controls to the water.

December 29: Gov. Snyder takes action on initial findings from Flint Water Task Force.

2016

January 4: Genesee County Commission votes for emergency declaration

January 5: Gov. Snyder declares emergency for Genesee County due to the ongoing health and safety issues caused by lead in the city of Flint's drinking water

- *By declaring a state of emergency, The Governor has made available all state resources in cooperation with local response and recovery operations.*
- *The declaration authorizes the Michigan State Police, Emergency Management and Homeland Security Division (MSP/EMHSD) to coordinate state efforts.*
- *In addition to the emergency declaration, the Governor activated the State Emergency Operations Center to coordinate state departments, the state's response, resources, and relief and recovery activities.*
- *The SEOC is the emergency operations center for the state of Michigan. Located in Lansing, the center is overseen by the MSP/EMHSD and coordinates response and recovery efforts by state agencies and local government. The SEOC is staffed by members of state agencies and other partners for decision making and information coordination during disasters or emergencies in the state of Michigan.*
- *On Jan. 6, the Joint Information Center was opened to lead the state's messaging and information response in coordination with the local Emergency Operations Center, Genesee County, and the City of Flint.*

January 8: Gov. Snyder and Flint Mayor Weaver meet to discuss how city and state can work on water issues.

January 9: MSP Emergency Management Division announces water resource sites established in Flint with bottled water, filters and testing kits

FEMA/National Guard/Resources

- Governor has requested support from FEMA
  - Coordinate interagency recovery plan
  - Identify federal agencies that have programs, authorities, and technical expertise to assist
  - At this point there is not a federal declaration. FEMA is not currently sending supplies to this incident.

- In addition to requesting support from FEMA, the Governor has activated the Michigan National Guard to help our local volunteers distribute supplies at the five water resource sites.
  - The resource sites are open seven days a week from 9 a.m. to 9 p.m. at Flint fire stations.
    - Fire Station #1 310 East 5th St. Flint, MI 48502
    - Fire Station #3 1525 Martin Luther King Ave. Flint, MI 48503
    - Fire Station #5 3402 Western Rd. Flint, MI 48506
    - Fire Station #6 716 West Pierson Rd. Flint, MI 48505
    - Fire Station #8 202 East Atherton Rd. Flint, MI 48507
  - There are water resource teams going door to door to ensure every resident has a water filter and additional water resources
  -
  - Residents who need immediate help should call 211 or the governor's office at 517-335-7858
    - 211 is open 24/7/365
    - To assist the residents of Flint, Governor Snyder's office has committed ensure the constituent relations division will be open 7 days per week from 8 am until 5 pm until further notice.

- The Michigan State Police continue to lead the door to door mission of reaching every Flint resident. They are assisted by the Genesee County Sheriff's office, state of Michigan employees, and volunteers from organizations such as the American Red Cross.
- One of our top priorities is ensuring Flint residents know the resources that are available to them. We have used direct mail, automated calls, emails and bill boards to ensure residents know that information on water resources is available by calling 211 or visiting www.michigan.gov/FlintWater

Additional information

Corrosion Control ~~(From DEQ)~~

- On October 16, 2015 Flint returned to using water supplied by DWSD. The water supplied by DWSD is a finished product ready to use and already has phosphate added to it to assist with corrosion control.

- Recognizing that the level of phosphate in the water from DWSD was designed to be a maintenance dosage, the DEQ and the Flint worked together to bring online supplemental phosphate addition so as to speed up the rebuilding of the protective layer in the distribution system.

- ~~On October 28, 2015 the MDEQ issued a construction permit to Flint for the supplemental corrosion controls.~~

- ~~Flint worked diligently to order and install the necessary equipment and on December 9, 2015 the city began supplemental corrosion controls.~~

- The DEQ is now partnering with Flint, the U.S. EPA and other governmental entities to proactively identify bottlenecks so that the eventual switch from DWSD to the KWA can be done smoothly and with safety being the top priority.

- ~~It is important to note that the water that will be coming from the KWA will have very similar background characteristics as the water currently coming from DWSD.~~

- Even with ~~these~~ similarities between DWSD and KWA water, precautionary measures are being taken.
    - These measures will include running the Flint Water Treatment Plant on a trial basis for a period of time without sending the water into the distribution system so that all of the treatment processes can be thoroughly evaluated.
    - In addition, bench top testing will be conducted to assist in determining how the Water Treatment Plant processes can be optimized.

- The KWA will be supplying raw water. This water will need to be treated by each of the respective water supplies.

- When KWA comes on line, Flint will be receiving raw water that is similar to the raw water that DWSD treats.
    - Flint will then need to operate the water treatment plant for an (as of yet) undetermined period of time.
    - Once Flint has demonstrated that it is capable of generating water with the desired background characteristics it will then be able to then send water to the distribution system.

- For non-Flint residents who want to test their water for lead – they can purchase a testing kit from DEQ for $18 – details follow:
    - Anyone in Michigan who wants to test their water for lead can call the State Drinking Water Lab at 517-335-8184.
    - The lead testing kit costs $18, which includes the sample bottle and instructions shipped to your home as well as the lab test. It does not include the cost of shipping your filled sample bottle back to the lab.
    - Depending on the lab workload, results are typically available within 1-2 weeks.

- Your results will include information about the EPA's lead recommendations as well as contact information for your local health department, which can help you interpret your results further, if needed.

Addressing Flint's Water Concerns

Recent events have raised concerns among many as to the safety and quality of the water provided by the City's utility system. The City is and continues to be committed to assuring that residents and visitors know that the water is safe and that those responsible for providing water are working every day to improve the quality of the water. The quality of the water does need improvement, but that is not to be confused with safety of the water. The recent notice by MDEQ clearly stated that the water provided by the utility system is safe to drink, but cautioned that some vulnerable groups may want to consult with their health care provider if they have concerns. The City remains committed to their efforts to assure that the water is safe for everyone and that quality is both improved and improving.

To date, the City has taken the following actions:

- As an integral part of the transition to the Flint River on a temporary basis, the MDEQ was consulted about the City's plans, and ultimately issued necessary permits to proceed. The City also engaged the services of the LAN engineering firm to guide the city in installing the necessary equipment to treat the water on an ongoing basis. This resulted in the development of a comprehensive drinking water plan.

- The City monitors its water quality on a daily basis to assure that water quality remains within established guidelines. With the variances in water temperature and the leakage and infiltration problems arising as the result of failure of parts of the distribution system, water quality did exceed, for a time, some of the established guidelines. This resulted in the issuance of the recent notices to the public. Upon receipt of information that some guidelines were exceeded, the City's priority focus was to bring water quality back within guidelines. Efforts taken to address non-compliance included increasing water flow through valve replacements and hydrant flushing and optimizing treatment processes.

- The City has committed to increasing communication with the public in order to inform water users factually of the issues which have arisen, to alleviate unnecessary concern and to identify the steps being taken to address the issues. This is being implemented through detailed and easy to understand educational materials being made available both online and at City Hall, as well as through ongoing public informational meetings.

- Most recently, in light of recent concerns raised by resident groups over the quality and safety of water, Department of Public Works Director Howard Croft and his staff collected questions from citizens during a recent public meeting. After reviewing these questions, DPW Director Croft and his staff set out to answer them in concise detail; the result of that work is a full Water System Questions and Answers document is available online. Along with the detailed information within, the document also contains links to other source documents and regulatory statutes found online which were used as reference. **"We want the residents, businesses and visitors of Flint to know that the water in Flint is safe**

and that we are working every day to make improvements to our system to ensure that," said Croft. "Our goal is make sure we get people the information on our efforts and assure them that we are on the right track with them." More documentation, including regular water quality monitoring reports, will be made available.

- Additionally, a number of public meetings have and will continue to take place. Two of the most recent of these took place at the Antioch Baptist Church and the Mott Community College Regional Technology Center. These meetings were held by concerned neighborhood groups and were attended by Mayor Walling and DPW Director Croft. At both meetings, citizens voiced their concerns and asked questions about water quality and the recent violation notice. Director Croft offered detailed answers to common questions, but also offered to investigate specific water issues raised by residents in which the City could offer assistance. Those in attendance came away with a better understanding of the issues surrounding the drinking water in their community.

- The City of Flint will be hosting a water presentation on **Wednesday, January 21, 2015 at 7pm. That presentation will be held in the City Hall Dome** and will feature information detailing water treatment, water distribution and the steps being taken to ensure that citizens get water that meets all regulatory safety and quality standards. City DPW Director Howard Croft and Daugherty Johnson, Utilities Administrator, will be joined on a panel by representatives from the Genesee County Drain Commissioner's office, the Michigan Department of Environmental Quality and LAN engineering. Written questions from the audience will be collected during the presentation and answered by the panel after the presentation.

- The City of Flint has also determined that in light of the serious concerns raised, it will secure the services of an external firm with expertise in managing drinking water quality to assess the steps that the city has taken, to make recommendations as to other steps to be taken, to oversee their implementation, and to monitor operations until the City's water source becomes the KWA. A Request for Proposal was issued on January 15, 2015, with proposals due back on January 26.

The DWSD Question:

As a result of the concerns raised, several community members have suggested that the City reconnect to the Detroit Water and Sewer Department (DWSD). DWSD has advised that they would be willing to allow such a reconnection without a hook-up fee. However, the City would be obligated to pay a fixed monthly charge of $846,700 plus the $14.92/Mcf cost of water itself and agree to a long term arrangement. The City's analysis of the DWSD proposal concludes that the City's cost would increase by more than $12 million per year at the proposed rates, and could increase even more as proposed rates are subject to change after July 1, 2015. This increase in costs would not be in the best interests of the City or its water users, as the City is committed to assuring safety and improving water quality by following its current plan, and reconnecting to DWSD would likely require deferment of existing capital improvements or an additional increase in rates.

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

December 16, 2014

DEQ Resource Management Division
DEC 17 2014
Administration Section

Mr. Brent Wright, Operation Supervisor
City Of Flint - DPW
Flint Water Plant
4500 North Dort Highway
Flint, MI 48505

WSSN: 02310

Dear Mr. Wright:

SUBJECT: Violation Notice – Maximum Contaminant Level for Total Trihalomethanes
Operational Evaluation – Total Trihalomethanes
4th Quarter 2014 Monitoring Period

The Department of Environmental Quality (DEQ), Office of Drinking Water and Municipal Assistance (ODWMA), records show that the City of Flint is in violation of the Safe Drinking Water Act,1976 PA 399, as amended (Act 399); R 325.10610, *Maximum contaminant levels* (MCL) *for disinfection byproducts*, of the 1979 Administrative Code.

In accordance with R.325.10610, *MCLs for disinfection byproducts*, of the 1979 Administrative Code, the MCL for disinfection byproduct total trihalomethanes (TTHM) is 0.080 milligrams per liter (mg/L) as a Locational Running Annual Average (LRAA) at each monitoring location. As listed in the table below, our records show that the City of Flint's highest TTHM locational running annual average (LRAA), based on the last three quarters, ending November 30, 2014, is 0.099 mg/l which exceeds the standard, and that two of the eight sample site locations exceed the standard of 0.080 mg/L.

Further, in accordance with R325.10719l, *Disinfection byproducts: operational evaluation levels*, of the 1979 Administrative Code, when an operational evaluation level (OEL) at a monitoring location for TTHM exceeds 0.080 mg/L, a supply shall conduct an operational evaluation and submit a written report of the evaluation to the department not later than 90 days after being notified of the analytical result that causes the supply to exceed the operational evaluation level. As listed in the table below, our records show that TTHM operational evaluation levels for the City of Flint exceed 0.080 mg/L at four of the City's eight sample site locations.

TTHM Results (mg/L)					
	5/21/14	8/21/14	11/20/14	LRAA	OEL
DBP1 McDonalds 3719 Davison	**0.162**	**0.145**	0.059	**0.092**	**0.106**
DBP2 Liquor Palace 3302 S. Dort Highway	**0.112**	**0.127**	0.033	0.068	0.076
DBP3 North Flint Auto 6204 N. Saginaw St.	**0.097**	**0.118**	0.041	0.064	0.074
DBP4 University Market 2501 Flushing Road	**0.106**	**0.196**	**0.094**	**0.099**	**0.122**
DBP5 Taco Bell 3606 Corunna Road	0.079	**0.181**	0.034	0.074	**0.082**
DBP6 Rite-Aid Pharmacy 5018 Clio Road	**0.088**	**0.144**	0.054	0.072	**0.085**
DBP7 Salem Housing 3216 MLK Boulevard	**0.082**	**0.112**	0.050	0.061	0.074
DBP8 BP Gas Station 822 S. Dort Highway	0.075	**0.112**	0.036	0.056	0.065

Our investigation consisted of a review of ODWMA files for laboratory reports received for compliance monitoring. Our investigation is considered complete. This violation began on December 1, 2014, and will continue until TTHM LRAA is below the MCL at all sample sites.

We acknowledge and appreciate the city's cooperation with our recommendation to preemptively conduct an Operational Evaluation following the City's second quarterly round of monitoring in August. That Operational Evaluation report has identified possible causes and corrective measures for the elevated TTHM levels which we encourage the City continue implementing. These modifications have likely contributed in part to the reduction in TTHM levels reported in the most recent quarter, and suggest the City may be able to achieve compliance with the TTHM standard.

Our office is continuing to review the Operational Evaluation report that was submitted on December 1, 2014, and will provide the City and their consultant comments as needed to help address this MCL violation.

Water systems that exceed the OEL must complete and submit an Operational Evaluation in accordance with Administrative Rule 719l (R325.10719l) within 90 days of being notified of the violation. **An updated Operational Evaluation report, which incorporates the most recent sample results, must now be completed and received by our office by no later than March 1, 2015**.

If you have any other factual information you would like us to consider regarding the violation identified in this Violation Notice (VN), please provide them in a written response by January 16, 2015.

Administrative rule R 325.10403 of Act 399 requires that suppliers provide public notice (PN) as soon as practical, but no later than thirty (30) days after the supplier learns of this type of violation, by mail or direct delivery **and** by any other means reasonably calculated to reach customers not normally reached by mail. Enclosed is a sample PN

which contains the minimum required language. The City is encouraged to include additional information regarding its response to this violation. **Please notify your consumers by January 10, 2015, and send us a signed and dated copy of the notice that you issued within ten (10) days of distributing the public notice.** This violation must also be included in your 2014 Consumer Confidence Report (CCR), due by July 1, 2015. The PN must be repeated every quarter until you no longer exceed the TTHM standard. Failure to issue a PN for this violation will result in a fine of at least $1,000 per event, with a maximum of $5,000 per violation.

We anticipate and appreciate your continued cooperation in resolving this matter. If you have any questions regarding this VN, please contact us at the numbers below.

Sincerely,

Michael F. Prysby, P.E., District Engineer
Lansing District Office
Office of Drinking Water & Municipal Assistance
517-290-8817

Adam Rosenthal, EQA
Lansing District Office
Office of Drinking Water & Municipal Assistance
517-284-6644

mfp/ar/jlr
Enclosure

cc: Mr. Darnell Early, Emergency Manager, City of Flint
Mr. Daughtry Johnson, City of Flint
Mr. Howard Croft, City of Flint
Mr. Robert Bincsik, City of Flint
Ms. Jennifer Crooks, U.S. Environmental Protection Agency, Region 5
Genesee County Health Department
Ms. Liane Shekter Smith, P.E., DEQ
Mr. Richard Benzie, P.E., DEQ
Mr. Stephen Busch, P.E., DEQ

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

City of Flint Did Not Meet Treatment Requirements

Our water system recently violated a drinking water standard. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we are doing to correct this situation.

We routinely monitor for the presence of drinking water contaminants. Samples were collected for total trihalomethanes (TTHM) analysis from eight locations on a quarterly basis (May 21, August 21, and November 20 of 2014). The average of the results at **ANY** of the eight locations must not exceed the maximum contaminant level (MCL) for TTHMs, otherwise our water system exceeds the Maximum Contaminant Level (MCL). The standard for TTHMs is 80 µg/L. The location reporting the highest TTHM level was 99 ug/L; thus, our water system exceeds the TTHM MCL.

What should I do?

- There is nothing you need to do unless you have a severely compromised immune system, have an infant, or are elderly. These people may be at increased risk and should seek advice about drinking water from their health care providers.
- You do not need to boil your water or take other corrective actions. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours.

What does this mean?

This is not an emergency. If it had been an emergency, you would have been notified within 24 hours.

People who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.

What is being done?

We are currently working on solutions to correct the problem. We anticipate resolving the problem by 2015.

For more information, please contact Mr. Brent Wright at 517-787-6537 or the Flint Water Plant at 4500 North Dort Highway, Flint, MI 48505.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by the City of Flint.

CERTIFICATION: WSSN: 02310

I certify that this water supply has fully complied with the public notification requirements in the Michigan Safe Drinking Water Act, 1976 PA 399, as amended, and the administrative rules.

Signature	Title	Date Distributed

Reminder to water supplier: This notice / certification must be sent to the DEQ.

Daniel Early

Wed 10/28
10-12.
visit Flint

Dan W.
Jim S.
Lt Col.
Steve B.

1) BWA - working together
what's happening

2) THM - 9/10 correspondence
queried evaluation due.
* LAN extended
* spending money/partnerships for storage
→ want to discuss next round of
sampling + contingencies

3) case of legionella reported at
McLaren - 2 samples pos.
- dec HPC testing
share data w/ Melvern + UHD.
- ability + allowable ← will sample
civil construction 8-10 days for results.

Lab - 5-1

EH. Darrell Lacy — Bob Lee
Mgr. Arnold Lopez — Mike Morgan F.I
Mgr. Dan Kelley. — Brent Wyatt. HTP Sys.

Mr. Cogt -
broken valve (off) out of plant cooled
a dead end.
fixed valve, readings recovered.
avg 100 test/mo — do 120 tests/mo.
plant shop tested every 4 hrs.
fixing 10-20 valves/week.

Steam system on line — Steam 2016.
perception - Flint R. may not be best source
why? - most used [cost conscious?]
THM rise -
EH - asking for press release from DEQ.
- infrastructure upgrades to treatment.
demonstrate enhanced actions
rise.
would Flint switch you back to Detroit?
- No. ; need savings from using Flint R. 4 July
expect by Sept. to be worst months
open for Mill Trimble support?

- let people know next week's dates
- look at plan - open to discussion
- talk again before we send letter -
- technical info to clinics
- let us know if you need help.

CITY OF FLINT

DARNELL EARLEY, ICMA-CM, MPA
Emergency Manager

City of Flint
Municipal Center
1101 S. Saginaw Street
Flint, MI 48502

(810) 766-7346
Fax: (810) 766-7210
dearley@cityofflint.com

CITY OF FLINT
DEPARTMENT OF PUBLIC WORKS

DAUGHERTY JOHNSON III
UTILITIES ADMINISTRATOR

CITY HALL
1101 S. SAGINAW ST.
FLINT, MICHIGAN 48502

TELE: 810.766.7210 EXT. 2602
FAX: 810.766.7249
Email: DaJohnson@cityofflint.com

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY

Samir F. Matta, PE
Senior Project Manager

2121 University Park Drive, Suite 100 • Okemos, Michigan 48864
T 517.203.5437 • F 517.203.5439 • C 517.819.2567
www.lan-inc.com • SFMatta@lan-inc.com

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY

J. Warren Green, PE
Director of Engineering

One Oakbrook Terrace
22nd St. and Butterfield Road, Suite 307 • Oakbrook Terrace, Illinois 60181
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www.lan-inc.com • JWGreen@lan-inc.com

State says Flint hasn't applied for permit to use river as drinking water source

A look at Flint water plant's facilities

The city plans to switch over to the Flint River as a primary drinking water source in April. *(MLive.com File Photo)*

Dominic Adams | dadams5@mlive.com By **Dominic Adams | dadams5@mlive.com**

Follow on Twitter

on March 28, 2014 at 6:30 AM, updated March 28, 2014 at 6:35 AM

FLINT, MI – Not so fast, state officials are telling Flint administrators charging toward an April 18 date to begin using the Flint River for all of the city's water needs.

The Michigan Department of Environmental Quality says it hasn't received the proper paperwork from the city. When the state does get it, a review of the application for state permission to use the river could take 30 to 45 days.

The city is switching over from buying treated water from Detroit to using the Flint River for drinking water temporarily. Once the Karegnondi Water Authority completes its pipeline from Lake Huron to Genesee County, Flint will switch to the KWA.

"In regards to the actual application, we haven't received one," said Steve Busch, Lansing and Jackson district supervisor in the DEQ's office of drinking water and municipal assistance. "We've received preliminary design plans and preliminary specifications and we've commented on those. They may be waiting until they have all the comments worked out before they submit the application."

Flint has bought treated Lake Huron water from Detroit, but that contract was terminated when Flint signed on to purchase 18 million gallons of raw water per day from the Karegnondi Water Authority. The contract termination goes into effect April 17.

The under-construction pipeline will bring raw Lake Huron water to Flint and Genesee County when it is complete by the end of 2016.

People in the city will drink Flint River water until the pipeline is complete. The Detroit Water and Sewerage Department said it would **stop selling water to Flint and Genesee County** on its current contract on April 17, 2014. Genesee County is negotiating with Detroit for water until the KWA pipeline is flowing.

Busch said state reviews generally take between 30 and 45 days, but would not comment on if Flint would be ready to transition to river water by the time Detroit terminates the contract with the city.

"A fully engineered construction package, including all the work to be performed, has been submitted to the DEQ by the city of Flint in preparation for the transition to use of the Flint River as a temporary primary water source," said Howard Croft, Flint's director of public works, in a statement. "The submittal package has been under review for more than 30 days. The city has had ongoing discussions with the DEQ regarding the process and we anticipate a favorable response soon."

If the state hasn't approved Flint's use of river water by April 18, Busch said, the city would just continue to buy water from Detroit on a non-contract price until Flint has state OK to begin using the river.

"I don't think there is any scenario that we will just willy-nilly cut off service for Flint," said Bill Johnson, a consultant and spokesman for Detroit Water and Sewerage Department. "Negotiations are continuing."

Croft said the DEQ has been reviewing the request and asking questions throughout.

"When both sides come to an agreement and all issues have been addressed, then the permit is granted," Croft said in the statement. "Flint has been in ongoing communication with Genesee County and the DWSD to ensure that there is no interruption of water service to Flint customers. As the Mayor (Dayne Walling) said in his State of the City address 'beginning this spring, we will be using treated water from the Flint River as our temporary primary water source.' We are still on target to meet this goal."

Croft said there will be a series of public forums where residents can ask questions about the city's water transition, what that will mean for rates and others. He did not have specifics about when and where those meetings will take place.

*Dominic Adams is a reporter for The Flint Journal. Contact him at **dadams5@mlive.com** or 810-241-8803. Follow him on **Twitter, Facebook** or **Google+**.*

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STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

September 10, 2014

Mr. Brent Wright
City of Flint Water Treatment Plant
4500 North Dort Highway
Flint, Michigan 48505

SUBJECT: Compliance Communication
Total Trihalomethane Operational Evaluation Requested

Under the Stage 2 Disinfectants and Disinfection Byproduct Rule, the City of Flint has been required to collect samples for the analysis of Total Trihalomethane (TTHM) and Haloacetic Acids (HAA5) at eight sites within the City's water distribution system. The City has completed two quarterly monitoring periods since changing its source water to the Flint River effective April 25, 2014.

Normally an Operational Evaluation Level (OEL) would be calculated in accordance with the Michigan Safe Drinking Water Act, Public Act 399, 1976, as amended, Administrative Rule 7196 (R 325.107196), each quarter once three quarters of results have been obtained and compared with the respective maximum contaminant level (MCL) for TTHM. Normally the calculation would be made as follows:

(2 x current quarter + sum of 2 previous quarters) divided by 4

As the City of Flint currently has only two quarters of data, the calculation has been modified as follows:

(2 x current quarter + previous quarter) divided by 4

The resulting OEL for each site is listed in the table below. All results are in parts per billion (ppb):

		TTHM			HAA5	
	5/21/14	8/21/14	Mod. OEL	5/21/14	8/21/14	Mod. OEL
DBP1 McDonalds 3719 Davison	162.4	145.3	113	64	43	38
DBP2 Liquor Palace 822 S. Dort Highway	111.6	112	84	52	40	33
DBP3 North Flint Auto 3302 S. Dort Highway	96.5	127.2	88	48	31	28
DBP4 University Market 3606 Corunna	106.4	181.3	117	55	24	26
DBP5 B&P Gas Station 2501 Flushing	75.1	196.2	117	38	17	18
DBP6 Salem Housing 3216 MLK Boulevard	82.2	112.4	77	41	25	23
DBP7 Kroger 5018 Clio Road	88.2	144.4	94	49	30	27
DBP8 Taco Bell 6204 N. Saginaw	79.2	118.3	79	50	37	31

As shown in the table above, even with this less restrictive modified method, six of the City's eight sites already exceed the OEL limit of 80 ppb for TTHM. In addition, the City's two other sites are both more than 95% of the TTHM OEL limit.

The MCL for TTHM and HAA5 is based on a locational running annual average for each site, essentially the average at each site over the four previous quarterly monitoring periods. However, with TTHM levels of this magnitude, it is likely the MCL will be exceeded for at least one of these eight sites from just three quarters of monitoring results. For TTHM, four quarters at the MCL of 80 ppb (4 x 80) would provide 320 ppb allowable. As an example, site DBP1 through just two quarterly monitoring periods has a total of 307 ppb (162+145), leaving only 13 ppb over two more quarterly monitoring periods to maintain compliance with the MCL.

Therefore, this office is requesting the City of Flint complete an Operational Evaluation in accordance with Administrative Rule 719l (R325.10179l). The Operational Evaluation Report shall be submitted to this office no later than November 28, 2014. The report shall not be limited in scope and shall include the following:

Examination of Treatment Operational Practices
- Changes in source water quality
- Treatment changes
- Storage tank operations
- Excess storage capacity
- Treatment problems that contribute to TTHM formation

Examination of Distribution Operational Practices
- Storage tank operations
- Excess storage capacity
- Distribution system flushing

The report shall also include steps the City could consider to minimize future exceedances.

Additional guidance on completing the Operational Evaluation Report, including a number of forms that can be used to gather and evaluate water system information is provided in the United States Environmental Protection Agency's (U.S. EPA) Operational Evaluation Guidance Manual. This document is available on the U.S. EPA's website at the following link:

http://www.epa.gov/ogwdw/disinfection/stage2/pdfs/draft_guide_stage2_operationalevaluation.pdf

Be advised, failure to submit an Operational Evaluation Report by this deadline is a reporting violation subject to Tier 3 Public Notification.

The OEL is an indicator of operational performance. The water system must take proactive steps to be able to comply with the MCL's for TTHM and HAA5. While it is recognized that removal of Total Organic Carbon disinfection byproduct precursors as part of the treatment process has performed above minimum removal requirements under the treatment technique, around 4 parts per million of organic carbon are still present in the treated water and may be leading to additional TTHM formation in the City's distribution system.

While health effects associated with disinfection byproducts contaminants are based on chronic exposure, the City has available alternatives that must be considered to achieve compliance with this drinking water public health standard.

If you have any questions regarding this information, please contact me at the number below.

Sincerely,

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and
Municipal Assistance
Lansing District Office
(517) 290-8817

cc: Mr. Darnell Early, City of Flint
Mr. Daugherty Johnson III, City of FLint
Mr. Howard Croft, City of Flint
Mr. Robert Bincsik, City of Flint
Ms. Liane Shekter Smith, P.E., DEQ
Mr. Richard Benzie, P.E., DEQ
Mr. Stephen Busch, P.E., DEQ
Genesee Co. Health Dept.

Olszewski, Rosemarie (DEQ)

From: Wyant, Dan (DEQ)
Sent: Thursday, April 25, 2013 9:58 AM
To: Olszewski, Rosemarie (DEQ)
Cc: Thelen, Mary Beth (DEQ)
Subject: FW: DWSD Proposal
Attachments: Flint04.23.13proposalfinal_(1)__Signed[2].pdf; ATT00001.htm; Specification_Sheet_for_Evaluating_Water_Service_Options_to.doc; ATT00002.htm; EXH 1.pdf; ATT00003.htm; EXH 3.pdf; ATT00004.htm; EXH 2.pdf; ATT00005.htm

Please print for the Director (if not too long – long ones just do a few sheets). And please keep confidential. Thanks.

Mbt

Mary Beth Thelen
Executive Management Assistant to the Director
Department of Environmental Quality
Thelenm2@michigan.gov
517-373-7917 or 517-241-7390

FYI - cc Jim S cc Bill C cc Steve Bush DDWH D.

From: Dillon, Andy (Treasury)
Sent: Wednesday, April 24, 2013 8:48 AM
To: Wyant, Dan (DEQ)
Cc: Stibitz, Brom (Treasury); Tedder, Greg (GOV); Saxton, Thomas (Treasury)
Subject: Fwd: DWSD Proposal

FYI. Thanks for all of your help on this.

Sent from my iPad

Begin forwarded message:

orig: mbt FIL

> **From:** "Debra Ragland" <dragland@dwsd.org>
> **To:** "ekurtz@cityofflint.com" <ekurtz@cityofflint.com>
> **Cc:** "James Fausone" <jfausone@fb-firm.com>, "orrk" <orrk@detroitmi.gov>, "Dillon, Andy (Treasury)" <DillonA2@michigan.gov>
> **Subject: Fwd: DWSD Proposal**
>
> This email is being sent on behalf of Sue McCormick - Director, Detroit Water and Sewerage Department.
>
> Please replace prior email with this one.
>
> ---
>
> From: "Sue McCormick" <mccormick@dwsd.org>
> To: "Ed Kurtz" <ekurtz@cityofflint.com>

Cc: "Jim Fausone" <JFausone@fb-firm.com>, "orrk" <orrk@detroitmi.gov>, "dillona" <dillona@michigan.gov>
Sent: Wednesday, April 24, 2013 8:15:18 AM
Subject: DWSD Proposal

Good morning Mr. Kurtz,

Please find attached DWSD's proposal for continued service to Flint and Genesee County. Within the hour I will also send a power point file that provides a summary level presentation of the proposal.
I look forward to answering any questions you may have and supporting the conversation between you and Mr. Orr over the next few days.

Sue

Sue F. McCormick, Director
Detroit Water and Sewerage Department
735 Randolph, Room 506
Detroit, Michigan 48226
Office (313)224-4701
Fax (313)224-6067
McCormic@dwsd.org

CITY OF DETROIT
WATER AND SEWERAGE DEPARTMENT
OFFICE OF THE DIRECTOR

735 RANDOLPH STREET
DETROIT, MICHIGAN 48226-2830
WWW.DETROITMI.GOV

April 24, 2013

Ed Kurtz, Emergency Manager
City of Flint
1101 South Saginaw Street
Flint, Michigan

Dear Mr. Kurtz,

I am pleased to offer this Water Supply proposal for continued long-term water supply service to the City of Flint and Genesee County. DWSD is committed to becoming the provider of choice for Water service in Southeast Michigan and looks forward to the opportunity to partner with the City of Flint/Genesee County as the region moves forward. The proposal herein offers Flint the immediate opportunity for a 45% reduction in the cost of water supply saves the Flint/Genesee region over $900 million dollars as compared to the KWA alternative over the 30 year contract period.

On December 20, 1965, the Cities of Detroit and Flint entered into a Water Service Agreement (Agreement) for the City of Detroit Water & Sewerage Department (DWSD) to provide treated water to Flint and for Flint to provide DWSD water to other areas of Genesee County. That Agreement had a 35-year minimum and an indefinite maximum term and is currently in effect. There has been one Amendment to that Agreement dated July 18th, 1990. That amendment addressed a Flint request to reduce the minimum consumption requirement in the agreement by changing "Article 8 (A and B)". This amendment resulted in significantly lower costs to Flint. All other provisions of the Agreement remained unchanged. For over a decade the cities of Detroit and Flint have been in discussions for a successor Water Service Agreement to replace the Agreement currently in place. During the course of those discussions many different service alternatives have been considered but the cities have been unable to agree on terms that would allow their current Agreement to be replaced by a successor water service agreement.

In recent months, via a process largely governed by the State of Michigan, DWSD has proposed a number of alternative approaches for long-term water supply to the Flint/Genesee region. During a meeting with the State on April 19th a process and schedule was outlined that provided DWSD the opportunity to deliver a final proposal to Flint for continued service to the Flint/Genesee region. The proposal herein provides a public/public partnership approach in response to the water service requirements set forth by Flint / Genesee County / KWA as of April 22, 2013 (attached).

The following discussion and exhibits are designed to present the highlights of our submittal, and specifically respond to the points set forth in the request. In summary, our proposal reflects a public/public partnership approach with Flint that is designed to launch a cooperative arrangement toward solving water supply challenges in the Flint/Genesee region in a manner that best meets the interests of Flint and is equitable across the DWSD service area. Our proposed approach is responsive to the specification and has direct benefits to Flint/Genesee. Notably:

- Provides Flint, as partner with a capacity share in the Lake Huron Water Treatment Plant, the advantage of treatment costs calculated from a facility that has a lower cost of production compared to DWSDs other treatment plants; this capacity obligation is secured by a contractual obligation to successors and assigns;
- Effectively negates the distance and elevation factor that exists in the current rate structure to Flint, calculating transmission costs based on the line from the Lake Huron plant to the Baxter/Potter connection;
- Provides redundant (back-up) water supply at the Imlay City Pump Station and reflects fair recognition that Flint will provide a level of "reliability" on its own that DWSD currently provides to other wholesale customers, through construction and ownership of redundant transmission from the Imlay pump station West to Baxter/Potter or other point of connection as determined by Flint further maximizing Flint's interest in ownership of assets.

Highlights of our proposal:

Contract Structure – It is proposed that Flint would enter into a public/public partnership with DWSD that would reflect more input into and control over system investments and cost variables. The contract between Flint and DWSD would include "purchased capacity rights" in the "Lake Huron System" (defined below) based on the specific demands in an Exhibit B to the new contract, presumably the demands would be those included in the specifications attached. This is consistent in nature to DWSD's model contract that has been in place since 2008.

Revenue Requirement Responsibility – Limited to the costs associated with the "Lake Huron System", which includes the Lake Huron Water Treatment Plant and Intake and the transmission, pumping and storage facilities between the Lake Huron Plant and the delivery to Flint at the Baxter/Potter connection. Baseline revenue requirement data (including operating budget, rate of return, etc.) are identical to those developed for all other wholesale customers. No other DWSD costs will be allocable to Flint.

Proposed Rate Structure – Revenue requirements for the Lake Huron System will be recovered through a fixed monthly charge to recover allocated capital revenue requirements, plus a commodity charge to recover annual operating expenses. A separate fixed monthly charge is recovers the allocated "emergency standby" capital revenue requirements.

Redundancy Solution – Emergency backup supply is provided to the Imlay pump station, with the associated standby charge. A second transmission water main from the Imlay City Pumping Station west to either the current connection at Baxter/Potter roads or to another location to be determined by Flint, as necessary to meet the full redundancy requirements specified is assumed for comparison purposes. To maximize Flint's interest in ownership, it is proposed that this line will be constructed by Flint or KWA, and owned and operated by Flint or KWA. No costs associated with this transmission line are included in the proposed rate structure summarized in Exhibit 1. For the purposes of comparison of alternatives we have included an estimated annual revenue requirement for constructing such line, and these costs are reflected in the projections summarized in Exhibits 2 and 3. The costs for the second line included herein are consistent with those identified by TYJT in a follow-on effort to their report dated February 2013 on the

"twinned" line approach. Should Flint decide that it is not their preference to own this new transmission line, DWSD is receptive to other approaches, including DWSD financing and ownership.

Representation on the DWSD Board of Commissioners – DWSD is receptive to this concept and will pursue modification of the current governance structure to accommodate it.

Rate Increase "Guarantee" - DWSD proposes a guarantee that the capital portion of the Lake Huron System rate structure (the fixed monthly charge) will not increase for the life of the contract, unless additional capital investment is made in current and future Lake Huron System facilities. The only project in the current Capital Improvement Plan for the Lake Huron System is replacement of one low lift pump that is included in the fixed cost calculation. (Throughout this proposal the O&M escalation for the various revenue requirements are consistent with those applied in the TYJT evaluation conducted for the state.) In addition to the governance representation noted above and additionally through contractual treatment as a "partner" in a Lake Huron Operating Committee (proposed to have two Flint representatives and two DWSD representatives) Flint will have a level of control of such investments, and therefore a level of control over future capital revenue requirements included in the Flint rate structure. At Flint's option, an independent audit of the Lake Huron System costs can be requested annually and conducted by a mutually agreed upon firm and at a mutually agreeable cost.

Capacity - Flint will be entering a unique partnering agreement, initially purchasing capacity rights of 40 MGD in the Lake Huron Facility. The initial contract capacity would be set at 40 MGD per the specification. In addition, the contract will provide a reopener process every five years during which KWA may increase the contracted demands. DWSD will then allocate costs to Flint based on the new capacity requirement in the same manner as the initial allocation. This provision will accommodate potential growth in the KWA region without requiring Flint to encumber the full cost of projected future demands in early stages of the contract.

Proposed Rate Calculation

The annual revenue requirements are calculated (using FY 2013-14 as the baseline) as those that are allocable to the Lake Huron System. For purposes of this proposal, the Lake Huron System is defined as including:

- The Lake Huron Water Treatment Plant and related structures (intake, etc.)
- The 120" water main from the Lake Huron Plant to the Imlay City Pumping Station
- The Imlay City Pumping Station and related structures (reservoir, etc.)
- The 72" main from the Imlay City Pumping Station to the connection to Flint at Baxter/Potter Road

The Flint relative shares of the allocated Lake Huron System revenue requirement are based on the specifications provided by Flint. Capital costs have been allocated based on relative max day demands (for the plant) and peak hour demands (for the transmission facilities). Operation and Maintenance expenses have been allocated based on relative average day demands for all facilities.

The rate structure proposed herein recovers the allocated FY 2013-14 revenue requirements. All capital revenue requirements are proposed to be recovered through a fixed monthly charge. All operation and maintenance revenue requirements are proposed to be recoverable through a commodity rate applied to actual water purchases. An "average unit cost" per Mcf has been calculated based on the specification provided to illustrate the total revenue requirement expressed as a unit cost of projected water sales.

The analytical results of the proposal are illustrated in the attached table (Exhibit 1). Page 1 of this table shows the calculation of the proposed rate structure for FY 2013-14. As mentioned above, the fixed monthly charge associated with current capital costs of the Lake Huron System (shown on Line 1) will never increase so long as the purchased capacity requirement stays constant. Changes to the fixed monthly charge can increase only with (a) additional purchased capacity through the contract re-opener process (permissive to Flint), or (b) additional investment in Lake Huron System facilities for which Flint has both partnership input at the operating committee level and governance representation on the Board.

Page 2 of Exhibit 1 provides background to the rate structure calculation and illustrates the allocation of FY 2013-14 revenue requirements associated with the Lake Huron System facilities to Flint based on the contract demands set forth in the specifications document. It also illustrates the calculation of the emergency standby charge. This charge is designed to reflect the reservation of one day's worth of average daily capacity in the portions of the DWSD "backbone" (treatment and major transmission) system from which Flint will not receive "regular" service - and in which it will not be a "partner".

TYJT's report on the City of Flint Water Supply Assessment from February of this year included a number of tables and charts that compare revenue requirements to Flint under various alternatives. Attached herein is an updated Table 6.1 (Exhibit 2) which compares the cumulative annual cost of each option from the TYJT report with the new proposal included. We've also included an Exhibit 3 which is similar in format to Figure 6.1 in the TYJT report. However the data in this exhibit is a bit more inclusive, as it accumulates ALL of the annual utility costs for the KWA service area. DWSD submits that these exhibits illustrate the comparative advantage of DWSD's current proposal to the KWA proposal, and demonstrate the significant cost advantage provided with the innovative public/public partnership approach we are proposing.

In the nature of an executive summary or overview, we have submitted a companion power point presentation that calls out many of the significant features of this proposal. This is firm offer that is available with the rate season beginning July 1, 2014, however we remain open to discussion and negotiation.

Best regards,

Sue McCormick, Director
Detroit Water & Sewerage Department

Specification Sheet for Evaluating Water Service Options to Flint and/or KWA/Genesee County (KWA/GC) Service Area

Issued: April 22, 2013

Purpose: The purpose of this document is to 1) clarify the water service requirements so that DWSD may submit a proposal responsive to the current requirements of Flint and/or KWA/GC and 2) provide a framework for a comparable and equitable analysis of water service proposals from DWSD, KWA/GC, and/or any other parties.

- **Scope:** DWSD's proposal will be evaluated based on water service delivery to(select one):

  Flint only **or** Flint and KWA/GCC

2. **Objectives:** Identify the outcomes and criteria that serve as the basis for evaluating water service based on the scope defined in Q. 1 above.

- **Maintain current supply standards**
- **Reduce our cost share of DWSD system we don't use**
- **Stabilize rate**
- **Increase control over cost variables (be an owner, not a user)**
- **Redundant service at Baxter Potter**

3A. Treated Water Capacity Worksheet (5 Year Increments 2013-2042)

		2013	2018	2023	2028	2032	2037	2042
	Flint							
	Pressure Range							
	Max Day(MGD)							
	Peak Hour(MGD)							
	Avg Day (MGD)							
	KWA/GC							
	Pressure Range	**50 PSI Winter 65 PSI Summer**						
	Max Day(MGD)	**40**	**43**	**47**	**50**	**53**	**57**	**60**
	Peak Hour(MGD)	**44**	**47**	**52**	**55**	**58**	**63**	**66**
	Avg Day (MGD)	**25**	**27**	**29**	**31**	**33**	**35**	**35**
	Total							
	Pressure Range							
	Max Day(MGD)							
	Peak Hour(MGD)							
	Avg Day (MGD)							

3B. Raw Water (End Use) Capacity Worksheet (5 Year Increments 2013-2042) in excess of the specified treated water requirements

		2013	2018	2023	2028	2032	2037	2042
	Flint							
	Pressure Range							
	Max Day(MGD)							
	Peak Hour(MGD)							
	Avg Day (MGD)							
	KWA/GC							
	Pressure Range	0						
	Max Day(MGD)	0						
	Peak Hour(MGD)	0						
	Avg Day (MGD)	0						
	Total							
	Pressure Range	0						
	Max Day(MGD)	0						
	Peak Hour(MGD)	0						
	Avg Day (MGD)	0						

4. **Provide Redundancy/Reliability alternatives for Treated Water?** Circle yes or no for each

For Flint: Yes or No For KWA/GC **Yes**

Option 1 -Full redundancy-2nd source (specify delivery point)

--Baxter Potter or second point into Genesee County

Option 2 – Redundancy via storage (specify location point and volume)

--Not Applicable

5. **Permission to blend?** **No**

If Yes, specify any operating requirements/limitations to blending.

6. **Representation:**

On DWSD Board? **Yes**

On DWSD Operating Committee? **Yes**

7. **Capital Costs:** Capital improvements/upgrades requested to achieve water service objectives.

--See No. 4

8. **Pricing:** Cost of service based on a rate model specific to named facilities and auditable account structure.

Alternative 1: **Annual rate** proposed based on budget and estimated usage, billed monthly based on metered usage.
Electable option: Subject to annual audit and true up in the next full rate year after close of audit. **NA**

Alternative 2: Annual fixed amount proposed based on budget and estimated usage; billed monthly in 12 equal monthly bills. Subject to annual audit and true up in the next full rate year after close of audit. **NA**

Alternative 3: Customer specified pricing requirement(s)
- Redundant service as a separate fixed rate

- Annual fixed amount with a commodity charge based on service from Port Huron and pipeline only.

- Capital cost and O & M for Port Huron operations only

9. **Other Criteria:** Identify any other criteria or materials that DWSD should provide for an objective evaluation of DWSD provided service compared to non-DWSD options.

- All current and future costs not to increase by more than 4.7% annually over the life of the contract

EXHIBIT 1
Calculation of DWSD Water Rate to KWA
Hypothetical FY 2013-14 Rate Structure

		Annual Rev Req't (millions)	Unit Basis	Units	Avg Unit Cost	Rate Structure	
1	Capital Revenue Requirements	$ 6.09	months	12		$ 507,600	per month
2	Operating Revenue Requirements	$ 4.40	Mcf	1.220		$ 3.61	per Mcf
3	Subtotals / Avg Unit Cost	$ 10.49		*1.220*	*$ 8.60*		per Mcf
4	Standby Charge	$ 3.32		12		$ 276,900	per month
5	Totals / Avg Unit Cost	$ 13.81		*1.220*	*$ 11.32*		per Mcf
6	Total Monthly Charge					**$ 784,500**	**per month**
7	Total Commodity Rate					**$ 3.61**	**per Mcf**
8	*plus: Redundancy Solution (a)*	*$ 8.59*		*Not a DWSD Cost*			

(a) Redundancy Solution Calculations

9	*Cost of Redundant Line*	*$ 94.68*
10	*Issuance Expenes, etc.*	*$ 2.18*
11	*Required Financing*	*$ 96.86*
12	*Finance Rate*	*5%*
13	*Finance Term*	*25*
14	*Annual Payment*	*$ 6.87*
15	*Debt Svc Coverage*	*125%*
16	*Annual Revenue Requirement*	*$ 8.59*

TFG

PRELIMINARY THE FOSTER GROUP 4/23/13

EXHIBIT 1

Allocation of FY 2013-14 Revenue Requirements

		"LH System"		KWA Communities		
		Revenue Req't *$ millions*	Capacity / Usage *mgd*	Capacity / Usage *mgd*	Relative Share *%*	Revenue Req't *$ millions*
	Capital Cost Recovery					
1	Treatment - LH WTP	30.35	400	40	10.0%	3.04
2	Pipeline - LH to Imlay	1.35	440	44	10.0%	0.14
3	Imlay Station	6.85	440	44	10.0%	0.68
4	Pipeline - Imlay to Baxter/Potter	0.74	44	44	100.0%	0.74
5	Other (Meters, Outreach, etc.)	7.50	125	25	20.0%	1.50
6	Total Capital Cost Recovery	46.79			*13.0%*	6.09
	Operating Costs					
7	Treatment - LH WTP	15.02	125	25	20.0%	3.00
8	Pipeline - LH to Imlay	0.29	125	25	20.0%	0.06
9	Imlay Station	4.51	125	25	20.0%	0.90
10	Pipeline - Imlay to Baxter/Potter	0.23	25	25	100.0%	0.23
11	Other (Meters, Outreach, etc.)	1.02	125	25	20.0%	0.20
12	Total Operation and Maintenance	21.07			*20.9%*	4.40
	Annual Revenue Req't					
24	!!!Ctsrotmrrotu.!Mf!DX'CR;	35/43				6/03
25	!!!Cjqfrjpof!.!M !up!Jn rbz	2/75				1/2:
26	!!!Jn rbz!Tubujpo	22/47				2/6:
27	!!!Cjqfrjpof!.!Jn rbz!up!Cbyufs0Qpuf s	1/: 7				1/: 7
28	!!!Pvusfbdi -!Pvusfbdi -!fud/*	9/63				2/81
29	!!!!!Tvcupubm!EX TE!Sfwfovf!Sfr(u	78/98				21/5:

Dbrdvrbujpo!pgTuboecz!Di bshf

		Upubm	M !Tztufn	Pvufs
2:	Dbqbdjuz!.!In he	2-871	511	2-471
31	Upubm#Cbdl cpof#Dbqjubm!Dptut!.!%!jnjpot	338/65	57/8:	291/86
32	Vojt!Dbqjubm!Dptut	1/23:	1/228	1/244
33	Tuboecz!Sfrvjsfn fout!>!Bwfsbhf!Ebz			36
34	Tuboecz!Sfwfovf!Sfrvjsfn fou.!%!jnjpot			4/43

Flint residents should be drinking Flint River water by mid-April, officials say

Loading Photo Gallery

Sarah Schuch | sschuch@mlive.com By **Sarah Schuch | sschuch@mlive.com**
on March 12, 2014 at 6:10 PM, updated March 12, 2014 at 6:13 PM

FLINT, MI – If all goes as planned, Flint residents will have Flint River water flowing from their taps by mid-April.

Flint city leaders and Flint Water Treatment Plant officials held a ceremonial groundbreaking Wednesday, March 12, to mark the start of the process of drawing water from the Flint River.

"This is an important day for us as we break ground on this new project in the city of Flint," said Flint Mayor Dayne Walling. "The river is an invaluable asset."

The city has bought its water from Detroit, but that contract was terminated when Flint signed on to purchase 18 million gallons of raw water per day from the Karegnondi Water Authority.

The under-construction pipeline will bring raw Lake Huron water to Flint and Genesee County when it is complete by the end of 2016.

People in the city will drink Flint River water until the pipeline is complete. Detroit Water and Sewerage Department Director **said it would stop selling water to Flint and Genesee County on April 17, 2014.**

In the next couple of weeks, six more employees will be hired to help keep the water treatment plant better staffed as it is used to its full capacity. After the new hires are on board, there will be a total of 26 employees with at least four employees working at any given time, compared to the one on duty now.

The plant, which is used as a backup water supply to Flint and Genesee County, will go from being used four times a year to year-round.

Work will also take place within the next two weeks to update the electrical system from the 1950's, said Brent Wright, plant superintendent.

After Detroit cancelled its water contract here, **Flint has spent about $4 million in upgrades at the water treatment plant in the past eight months.**

"What we're doing with the upgrade is increasing reliability," said Daugherty Johnson, utilities administrator at the water treatment plant.

The treatment plant could easily be used now if it had to be used, Wright said. There is 55 million gallons of water already in storage. But the process now is to make sure the plant is well staffed and updated to handle the greater use, Wright said.

In the next year, a small pump lift station will also be built.

"This is a tremendous step in the process of securing Flint's water future," Walling said.

When it's time to switch over, the process should be smooth and effortless, Wright said. Before the switch is complete, the Flint water treatment plant will already be fully operational, testing the process a couple weeks before the process is complete.

Then once they are ready to go, plant officials will simply turn off the switch for the 72-inch pipeline from Detroit and turn on the switch for the 36inch pipeline that will draw in water from a location in the Flint River near the plant.

The target date for the switch is mid-April. On average, the plant will see 12 million gallons of water going through daily.

When Wright started working at the plant 23 years ago, he was told they would be starting the process to no longer purchase water from Detroit. And now it's happening.

"We're finally doing it. And I get to see it," Wright said.

Sam Muma, president of AFSCME Local 1600, said it's good to see the plant being used to its full potential and for the river to be utilized to its full potential.

In all, the upgrades and further use of the water treatment plant will be a benefit to the community, Muma said.

"This is a good thing for the community. It will provide jobs," Muma said. "Anytime you can be self-sufficient is a good thing. Doing this should eventually decrease water rates for the residents in Flint."

The long-term goal is to have more water efficiency and more cost savings in water rates.

The hope is to also bring school children out to the plant to have educational tours.

"Today marks the beginning of the new narrative of the city of Flint," said Flint's Director of Public Works Howard Croft.

City says Flint River water will be pumped to homes, businesses Monday, April 21

Ron Fonger | rfonger1@mlive.com By **Ron Fonger | rfonger1@mlive.com**
on April 17, 2014 at 11:00 AM, updated April 17, 2014 at 12:30 PM

FLINT, MI -- Faucets in the city will be filled with **Flint River water** starting Monday, April 21, officials said today, April 17.



Flint emergency manager Darnell Earley speaks at a news conference today, April 17, inside Flint City Hall.

Ron Fonger | MLive.com

Emergency Manager Darnell Earley and city public works officials said they plan to open gates at the Flint water treatment plant at 2 p.m. today, bringing in about 12 million gallons of river water for treatment test runs that are expected to continue throughout the weekend.

That step will mark the beginning of the end of nearly 50 years of Flint's reliance on the city of Detroit for its water.

Representatives with the state Department of Environmental Quality are expected to be here Friday, April 18, to ensure that treatment plant upgrades they have issued permits for have been completed.

If all goes according to plan, a mix of river water and residual Lake Huron water will flow into homes and businesses Monday, and officials said they don't expect customers to notice a difference -- in pressure, appearance or taste -- from what they are drinking now.

"We're proceeding as planned," Earley said. "I'm very pleased ... We have the opportunity to use the natural resources of the river ... We have a better mechanism to manage our costs. It's strictly our product now."

Although Flint River water has been used in emergency situations and treated quarterly before being discharged back to the river, Monday will be different.

"This time, we do not intend to stop drawing the water in until the (Karegnondi Water Authority) pipeline is completed," said Howard Croft, Flint's public works director.

"We believe that on Monday, we will be in a position to close the valve to Detroit," Croft said.

Today's announcement by city officials comes on the day after the city of Detroit terminated its contract to sell water to Flint and Genesee County under the terms of an expired contract and instituted a new price structure, adding what amounts to a surcharge of about 10 percent.

Most public water customers in Genesee County, outside the city of Flint, will continue to receive Lake Huron water purchased from the city of Detroit by the county Drain Commissioner's Office and resold by cities and townships to home and business customers.

The city and county have formed the KWA to fund a $600-million pipeline project designed to supply the region's water for decades. Construction on that massive public works project is underway and is expected to be completed by the close of 2016.

Follow our live blog today when Flint residents can learn more about the city's water source and what future water rates could be during **two meetings today**.

A forum for Flint restaurateurs is scheduled for 3 p.m. inside Café Rhema, 432 S. Saginaw St., and will allow local managers and owners to address questions about the new water source.

The second meeting will be an informational presentation in the council chambers at Flint City Hall at 5:30 p.m. and will allow residents to ask questions about a study from Raftelis Financial Consultants, Inc., which recommended a $52.56 annual increase to water and sewer rates for the average residential customer in 2015.

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Rennaker, Joanne (DEQ)

From: Shekter Smith, Liane (DEQ)
Sent: Monday, August 03, 2015 3:34 PM
To: Cook, Pat (DEQ); Busch, Stephen (DEQ)
Subject: FW: FOR REVIEW: MDEQ - Flint Call Notes
Attachments: MDEQ Call on July 21_call notes v4.docx

Just received the attached. Haven't reviewed it yet.

From: Hyde, Tinka [mailto:hyde.tinka@epa.gov]
Sent: Monday, August 03, 2015 3:31 PM
To: Shekter Smith, Liane (DEQ)
Cc: Poy, Thomas; Bair, Rita
Subject: FOR REVIEW: MDEQ - Flint Call Notes

Hi Liane – Attached are our notes from our call on 7/21 regarding Flint Drinking Water System. Please take a look and let me know if you have any questions or comments. Thanks

Rennaker, Joanne (DEQ)

From: Shekter Smith, Liane (DEQ)
Sent: Tuesday, July 21, 2015 10:52 AM
To: Hyde, Tinka
Cc: Poy, Thomas; Bair, Rita; Damato, Nicholas; Busch, Stephen (DEQ); Cook, Pat (DEQ); Benzie, Richard (DEQ)
Subject: RE: AGENDA for Today's Call on Flint

Thanks Tinka.

During discussion issue #1, we would like to discuss our (hopefully, mutual) understanding of the timeline for next steps.

Also, while we understand your concerns with the overall implementation of the lead and copper rule(s); we think it is appropriate for EPA to indicate in writing (an e-mail would be sufficient) your concurrence that the city is in compliance with the lead and copper rule as implemented in Michigan. This would help distinguish between our goals to address important public health issues separately from the compliance requirements of the actual rule which we believe have been and continue to be met in the city of Flint.

And finally, we would also like to discuss our concern that the draft report was released by EPA and that we (DEQ) obtained a copy of the report from an outside (ACLU) website.

Liane J. Shekter Smith, P.E., Chief
Office of Drinking Water and Municipal Assistance
Michigan Department of Environmental Quality
517-284-6543

From: Hyde, Tinka [mailto:hyde.tinka@epa.gov]
Sent: Tuesday, July 21, 2015 9:07 AM
To: Shekter Smith, Liane (DEQ)
Cc: Poy, Thomas; Bair, Rita; Damato, Nicholas
Subject: AGENDA for Today's Call on Flint

Hi Liane – In preparation for our call today we've prepared an agenda (attached) with some background and discussion points. Please let me know if you have other items you wish to discuss. Thanks

Tinka G. Hyde
Water Division Director
USEPA W-15J
77 W. Jackson Blvd
Chicago, IL 60604

Office: 312-886-9296
Cell: [redacted]

Notes on Call with MDEQ on July 21, 2015

MDEQ Implementation of LCR Rule and Flint Issues

Issue #1: Is there a public health concern regarding lead in Flint or other regulatory requirements?

- The 90th percentile results of the 2nd round of monitoring was 11 ppb.
- The population has dropped to under 100,000 and therefore the 1st round of 6-month monitoring was done for 100 samples, but the 2nd round only needed 60 samples.
- Customer-requested samples were included, but MDEQ did not have specifics on how many there were.
- Tinka asked about the timeline for Flint to switch over to the Lake Huron water source. MDEQ said the pipeline is under construction and scheduled to be complete by July 2016. MDEQ expects some delays and thinks a more realistic timeframe is October 2016.
- MDEQ explained that Flint would have 18 months to complete the corrosion control study and the complicating factor of switching over to Lake Huron. Should the corrosion control study be based on the Lake Huron source? MDEQ also explained that once Flint is using Lake Huron water that they would then need to complete 2 more rounds of 6-month monitoring to assess whether any adjustments to the corrosion control treatment was needed.
- MDEQ will be sending a letter to Flint telling them they need to complete a corrosion control study – based on results they are not optimized. Given the timing of completing a corrosion control study and the anticipated switch to Lake Huron water, MDEQ will have discussions with Flint and request that they start corrosion control treatment as soon as possible.
- MDEQ asked for Region 5's opinion on whether the regulations allow for the study requirement for Flint to be waived if MDEQ has Flint start pH adjustments and adding phosphates. Region 5 will look into this and get back to MDEQ with an answer. All acknowledged that if Flint initiated corrosion control treatment and continued to evaluate the system to ensure optimization that these efforts would essentially equate to a corrosion control study.
- The Region raised its concern about looking at treatment more comprehensively to ensure problems with DBPs didn't occur. MDEQ stated that Flint is on the brink of DBP compliance and that bacteriological issues haven't occurred since last year. Any adjustments for corrosion control treatment would need to make sure the other issues weren't exacerbated.
- Region 5 again offered the assistance of ORD staff, Darren Lytle and Mike Schock which MDEQ said they had shared with Flint already.

Issue #2: Discuss optimal corrosion control requirements

Discussion Items:

- MDEQ explained that they did not treat the switch to Flint River water as a "new system", but as a new source. It is their understanding that 2 rounds of 6-month monitoring is still needed to characterize the water quality. They don't know what is optimized until those 2 rounds of 6-month monitoring are completed.

DRAFT

- Region 5 noted that under 141.81(b)(3)(iii) that any system that has been deemed optimized must notify the State of any long-term change in treatment or the addition of a new source. The State must review and approve the change and may require any such system to conduct additional monitoring or other action to ensure that the system maintains minimal levels of corrosion in the distribution system. The State's requirement for 2 additional rounds of 6-month monitoring would fall under the "additional monitoring" prescribed by the State and not the initial 2 rounds of 6-month monitoring for new systems.
- Region 5 explained that they have talked to HQ about the interpretation of regulations and believes that systems that have been deemed optimized need to "maintain" corrosion control. The Region agreed to provide supporting regulatory citations for the language about maintaining corrosion control. Ed Moriarty in OGWDW is also consulting OGC on this topic and the OGC opinion will also be shared.
- MDEQ mentioned that there are other communities that may leave the Detroit system or connect to the new Lake Huron pipeline, but many of those either don't need to treat for corrosion control or will be building new treatment plants. Requirements for maintaining corrosion control for additional communities connecting to the Lake Huron pipeline will be discussed further after receipt of the HQ/OGC opinion.

Issue #3: Discuss Pre-flushing (as time allows)

- Lead compliance sampling procedures in the state of Michigan comply with Federal SDWA requirements which calls for a minimum of 6 hours during which there is no water used from the tap the sample is taken from.
- MDEQ is not interested in changing its position on pre-flushing until new regulations come out. They also pointed out that the pre-flushing instructions are not requirements, but suggestions.
- The Michigan pre-flushing instructions were developed as a way to ensure that sampled faucets were not stagnant for an excessive period of time beyond the targeted 6 hour (i.e., rarely used faucets or when a homeowner has been gone for an extended period of time).

Next Steps:

- **MDEQ will send a letter to Flint regarding the 2 rounds of 6-month monitoring results that exceed 5 ppb and the need for a corrosion control study. They will have discussions with Flint to request that they start corrosion control treatment as soon as possible rather than waiting for the completion of a study that can take 18 months.**
- **MDEQ and the Region were in agreement that it is important to get phosphate addition going in Flint as soon as possible. MDEQ mentioned tapping Mike Shock for help with this in the interim.**
- **Region 5 commented that we now have a path forward for Flint despite a difference of opinion on whether the regulations required Flint to "maintain" corrosion control treatment when they started serving treated water from the Flint River.**
- **MDEQ and Region 5 agreed that after Flint implements corrosion control treatment, when they switch back to Lake Huron water, they will need to continue the corrosion control treatment while conducting monitoring to determine if this treatment is optimized with the new Lake Huron water quality.**

DRAFT

- Region 5 will get back to MDEQ once it gets HQ/OGC's opinion on the need to "maintain" corrosion control treatment once a system is deemed optimized.
- MDEQ and Region 5 agreed that other communities currently implementing corrosion control treatment and change sources will need to continue to provide corrosion control treatment and conduct monitoring to determine whether the treatment is optimized with the new source water quality.
- Region 5 will research and get back to MDEQ on the 141.81 (3)(b)(5) citation and the ability to waive a CCT study.

DRAFT

Prysby, Mike (DEQ)

From: Ashford, Stephen (DEQ)
Sent: Tuesday, August 21, 2012 3:52 PM
To: 'Jim Redding'
Cc: Bloemker, Jon (DEQ); Prysby, Mike (DEQ)
Subject: RE: Lake Huron Intake Project

Jim,

The LHWSI Intake and Junction Chamber permit has been issued. The permit number is W122056 dated August 21, 2012. The permit should go out in the mail tomorrow. It has been a pleasure working with you and your team. May the LORD Jesus Christ bless this project.

Sincerely

Stephen L. Ashford, P.E. District Engineer
Resource Management Division
Department of Environmental Quality
Saginaw Bay District Office
989-894-6261 (office)
989-891-9213 (fax)

From: Jim Redding [mailto:JRedding@rowepsc.com]
Sent: Tuesday, August 21, 2012 2:35 PM
To: Ashford, Stephen (DEQ)
Cc: Bloemker, Jon (DEQ)
Subject: RE: Lake Huron Intake Project

Hi Steve,

Regarding your questions,

1. The County plans to provide the ability to back flush the intake; however, these provisions are planned to be incorporated into the pump station piping design. Having two intake cribs will enable us to supply water in the event one is damaged by a boat collision or lost by icing.
2. We don't believe that corrosion of the hardware will be a problem. Underwater, there is typically less available oxygen so corrosion occurs very slowly. Warren Green indicated that a recent video inspection of the Saginaw-Midland intakes showed that the hardware was in good condition. One intake was installed in 1947 and the other in 1994. Warren indicated that hardware on the 1994 intake still has paint on it. The paint specified for our project is a high quality 2 part epoxy. Also, the design for the crib is based on 20% of the strength of the hardware, so substantial loss by corrosion would be needed before there will be an impact to the integrity of the crib.
3. There is a reference in the specification regarding how the timber is to be grade-stamped if the timber will be stained or visible, but we will not be putting a coating or stain on the timber.

If there are other questions, please let me know. Thanks.

Jim Redding
Rowe Professional Services Company
810-869-5166
jredding@rowepsc.com

From: Ashford, Stephen (DEQ) [mailto:ASHFORDS@michigan.gov]
Sent: Tuesday, August 21, 2012 10:28 AM
To: Jim Redding

Cc: Bloemker, Jon (DEQ)
Subject: RE: Lake Huron Intake Project

Jim,

I have completed my review of the Lake Huron Water Supply Initiative Intake design and Junction Chamber. I have the following questions:

1. The top of crib 1 is 10 to 12 feet below the water surface. The top of crib 2 is 16 to 18 feet below the water surface. This raises two concerns. The first concern for crib 1 one is whether larger boats will run into the crib. The second concern for both cribs is whether both will plug with frazil ice at the same time. Question: Does the design include intake back flush capability?
2. Specification section 05550, "Bolts, Anchor Bolts, Expansion Anchors, and Concrete Inserts" indicates that submerged non-stainless steel metal parts will receive epoxy coating at a minimum. I am concerned that these coatings will not last 50 years. What is your opinion?
3. Specification section 06130 "Heavy Timber Construction" indicates that the timber on the intake will be stained or have a natural finish applied. Are these finishes NSF approved?

Please respond in writing. If we need to talk prior to the written response, give me a call.

Stephen L. Ashford, P.E. District Engineer
Resource Management Division
Department of Environmental Quality
Saginaw Bay District Office
989-894-6261 (office)
989-891-9213 (fax)

From: Jim Redding [mailto:JRedding@rowepsc.com]
Sent: Monday, August 20, 2012 5:16 PM
To: Ashford, Stephen (DEQ)
Subject: RE: Lake Huron Intake Project

Sounds good.

From: Ashford, Stephen (DEQ) [mailto:ASHFORDS@michigan.gov]
Sent: Monday, August 20, 2012 5:15 PM
To: Jim Redding
Subject: RE: Lake Huron Intake Project

Got them Jim; I will review both tomorrow Lord willing!

Thanks,

Stephen L. Ashford, P.E. District Engineer
Resource Management Division
Department of Environmental Quality
Saginaw Bay District Office
989-894-6261 (office)
989-891-9213 (fax)

From: Jim Redding [mailto:JRedding@rowepsc.com]
Sent: Monday, August 20, 2012 4:57 PM
To: Ashford, Stephen (DEQ)
Subject: Lake Huron Intake Project

Steve,
Attached are two specifications which I did not include in the permit application package.

- Section 05550 Bolts, Anchor Bolts, Expansion Anchors, and Concrete Inserts
- Section 06130 Heavy Timber Construction

These describe the materials used to construct the intake cribs.
Let me know if there are questions. Thanks.

Jim Redding

Honey
Susan

Leg-mOc Strike

- CMO must incorporate
- HPC from OEM
  Same to spec +64 include
  Leg-mOc

10 Lantern - 9/10 ≥23E

DCH
GCHO - Lead Role

- If he calls back
- Client 2 to meet
- Must have Sec. Tk 58 Mind
  DW can't 2 to Leg.
  # Comm. Hold to Confirm

CITY OF FLINT WTP
TTHM Response Plan Meeting Minutes
Notes from the meeting shown in red, bold font
November 7, 2014 9:30 am

Discussion Topics

I. Introductions

II. Purpose/Overview

WG provided an historical review of Flint WTP since ~1999 through today including design and regulatory concerns. Phase I improvements from 1999-2005 were completed to allow the plant to operate as an emergency back-up to DWSD supply for a moderate time period (4-6 weeks). Phase II improvements are defined as improvements to allow the plant to operate full time, without DWSD supply. The ultimate supply will be Lake Huron water supplied through the KWA system. The Flint River is the current supply until KWA supply is available. A treatability study was completed in 2002 which evaluated full time supply from the Flint River and contains information that is directly relevant to today's operations.

A. KWA supply timing
   1. Expected completion fall 2016
B. TTHM high level samples
C. Levels at multiple sites indicate source / WTP issue
   1. Problem did not exist on Detroit water
   2. 8 sites likely to exceed OEL

III. Suspected Causes
   A. Source water
      1. TOC has remained consistent
      2. Turbidity has remained consistent
      3. pH has remained consistent
      4. Increase in total Coliform

Period	Turbidity NTU	TOC Mg/l	Alkalinity Mg/l	Hardness Mg/l	pH	Total Col. Count/day
2001 Apr–Oct	7.9	9.4	215	272	8.1	870-1230 (7300 max)
2014 May–Sept	8.1	10.3 5/22/14	205	250	8.1	1500-5000 (22,398 max)

   B. WTP operation
      1. Ozone feed not working properly
      2. Recent increased chlorine feed
      3. Coag or floc polymer aids might not be optimized
   C. Distribution problems
      1. Low flow
      2. Dead ends
      3. Too much storage
      4. **City has unlined CI**
      5. **Cedar Street and West Side pump stations do not pump into defined pressure districts and may be recirculating water**

6. **City has been repairing/replacing valves which could be resulting in flow pattern changes**

IV. Operational Evaluation Report Requirements
   A. Distribution system evaluation
      1. Distribution evaluation and modeling by others
      2. Storage capacity evaluation
      3. **The City is considering water model updates and new simulations to evaluate possible improvements**

   B. Source water evaluation
   C. Treatment evaluation
      1. Jar testing
      2. No ozone piloting
      3. Experiment with coag and floc polymer aid dosages
   D. Timing / schedule

Letter from MDEQ states the report is to be submitted by 11/28/14. However, regulations state the public water supply has 90 days from the date of violation to complete the Operational Evaluation Report and Flint has technically not had a violation yet. The next sampling period is the 3rd week of November. SB stated the MDEQ would like to have a draft report by 11/28/14 that would not need to be entirely complete, but this would show a proactive approach by the City.

V. Possible Solutions
   A. Chlorine dioxide or chloramine

LAN believes there is a reasonable chance that chloramine would not be a strong enough disinfectanct but chlorine dioxide warrants further consideration.

   B. Decreased chlorine feed rate

A portion of flow through the WTP was being bypassed around the softening process and it was believed to be contributing to chlorine demand. The City has discontinued the bypass and it appears chlorine demand has dropped by 0.5 – 1.0 mg/l.

   C. pH adjustment
   D. Corrections/modifications to ozone

The City and LAN have looked at the ozone feed system and data suggests there is a problem though the exact issue is yet to be determined. Further investigation is planned as one high priority response.

   E. Coag & floc polymer aids (better TOC removal)

Jar testing is planned as part of the OER during which polymer aids will be further evaluated.

   F. Enhanced TOC removal with softening
   G. UV??? [with chlorine after for residual]
   H. Flushing to decrease water age?

The City is considering increased flushing to address both water age and rusty water.

   I. Lower storage tank high water levels (use less volume)?

VI. Other

- Chlorine demand through the filters is another concern. The City may shock the filters with high chlorine feed in an attempt to 'cleanse' them.
- Addition of flocculation and/or coagulation polymer feeds: MDEQ is open to the idea and would consider a letter submittal from the City listing the details in order to provide approval if the City wants to implement into the WTP process.
- The average flow through the WTP has fallen off from 18-19 mgd over the summer to ~14 mgd at this time.
- A TTHM limit violation is Tier 2 and will require the appropriate public notice.
- The City is currently achieving ~60% TOC removal.
- pH is currently 7.5-8.0 at WTP effluent.
- Costs to reconnect to DWSD supply have become prohibitive as a viable solution: $4 Million start up fee + $900,000 monthly flat fee + usage charges.
-

November 7, 2014

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
1311 South Linden Road, Suite B • Flint, MI 48532
T 810.820.2682 C 517.819.2367

Sign-in Sheet
City of Flint TTHM Response
MDEQ Meeting

Date/Time: 11-07-14 @ 9:30 am

Location: LAN Okemos Office

Name	Company	Phone Number	Email
Steve Busch	MDEQ	517-643-2314	buschs@michigan.gov
Michael Prysby	MDEQ	517 290-8817	PrysbyM@michigan.gov
JEFF HANSEN	LAN	810-820-2682	jrhansen@lan-inc.com
Pat Cook	DEQ	517-284-6514	cookp@michigan.gov
Daugherty Johnson	Flint	810 577-8906	djohnson@cityofflint.com
Howard Croft	FLINT	810 577-1202	hcroft@cityofflint.com
Warren Green	LAN	630-495-4123	jwgreen@lan-inc.com
MIKE GLASGOW	FLINT	810-787-6537	MGLASGOW@CITYOFFLINT.COM
BRENT WRIGHT	FLINT	810-787-6537	bwright@cityofflint.com
SFM	LAN	517-203-5437	sfmatta@lan-inc.com

CITY OF FLINT WTP
TTHM Response Plan Meeting
November 7, 2014 9:30 am

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   F. Enhanced TOC removal with softening
   G. UV??? [with chlorine after for residual]
   H. Flushing to decrease water age??
   I. Lower storage tank high water levels (use less volume)???

VI. Other

Optimize batch system of
No-reserve of pump station water
Hydraulic ?

Fr. 05/24/14

First Mtg - 930 AM

Phase 2 - 4 Mill.

Wastewater study - 1 yr $220 wages

Zarkon
Pilot-Time → PHASE 2 18 million

~~Pam study~~
MRK
THM Pot 350 PPB - 900 PPM
@ Cl2 - 7 - 2g mg/L dosage
5 mo-Hy chloroform

Fecal TC - 500 - 1200 MPN 7500 approx
@ 2 mg/L DO → 11-30 cent (goal 4)
3 mg/L → 5-16 cent
1 mg/L - 50% ↓

TOC = 10
@ Feed +2 yr → > 50% removal

TURBS — 10 NTU
Softy — 2-3 NTU
Study

Current — 0.7-1.0

Seen Big ↑ in TC

Not seeing as good performance From Ozonators

Not generating enough DAX
only 600 LBS/DAY per generator
rated @ 1300/DAY

In treatability Study

O_3
↓
$FeCl_3$ + Poly
↓ TOC
C20
Soda Ash → Cl_2 →

currently ~~we~~ NOT doing poly & Soda Ash

Need Soda Ash for NON CARB TOM.
& will add in TOC TOM.

Challenge
3- 3-5 Cl_2 demand in Filters
& is very high

In study } 2-2.5 mg/l O_3
} & 0.5 mg/l Cl_2

Gut + bot is not the case

Dist system — Res. Dance time issue

3 treatment needs
① ↑ O_3
② D-PE Coag/Soft to ↑ TOC Rem
③ ↓ Cl_2 demand @ Filter

2 issues @ WTP
TOC - reduce
TC
Cl_2

D-St
water age ↓
adapt to Cl_2

if TOC can be reduced, then look @ Cl_2

Consider

ClO_2 – Chlorine dioxide ≈ 2.6X stronger than Cl_2

Humic acids } could help in
Filter Aids } TOC ↓

Coag aid — ANIONIC @ 10 mg/L
Flocc Aid — NON IONIC .05 mg/L

* Air Stripping system come in at
5 – Million — 1½ to build
Solar Boost

Dust

UNDER Flushing Program
Valve fixing helps
But is overstated

DEPARTMENT OF ENVIRONMENTAL QUALITY

GOVERNOR'S OFFICE BRIEFING PAPER
CITY OF FLINT DRINKING WATER

What contributed to the Boil Water Advisories in the city of Flint?

A number of factors, not one specific cause, likely contributed to the Boil Water Advisories (BWAs) in the city of Flint during August and September 2014. While use of the Flint River has increased the amount of natural organic matter in the city's water, the Flint Water Treatment Plant (WTP) has performed well above treatment requirements for organic carbon removal. In addition, less than 20 percent of the water system was included in the advisory area. If treatment had been compromised, detections would have been widespread throughout the city, rather than in such a localized area.

The city's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the city's over 550 miles of water mains are now over 75 years old and constructed of cast iron piping. Cast iron pipe is subject to internal corrosion, called tuberculation, which causes buildup on the pipe interior, leading to water quality issues, reduced flow and pressures, and leakage. Tuberculation also encourages the development of biofilms, layers of bacteria that attach to the interior pipe wall. Biofilm growth is common in areas of piping with little or no disinfectant residual, and together with tuberculation can clog water lines to the point of insufficient water pressure.

The city has also experienced decades of a declining user base and water use associated with vacant homes, commercial businesses, and industrial property. Declining water use leads to excess residence time within the city's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and disinfectant residual degradation. While the city has recently seen an infusion of funding for blight removal, contractors completing this work have been improperly using fire hydrants, causing hydraulic disturbances that dislodged and suspended settled debris, which may have contributed to the bacterial contamination.

The winter of 2014 was also one of the coldest experienced by the water system. The city, which historically has unaccounted water losses of over 30 percent, has seen even greater losses since February 2014 due to an increase in cold weather-related water main breaks and leaks. The city lacks a formal maintenance program for its over 7,250 valves, which would normally be used to limit impacts during break repairs. Two valves on the transmission line used to supply the area of the BWAs were found to be closed during the city's investigation, causing longer residence time, reduced disinfectant residual, reduced flow, and reduced pressure. One of these valves has remained broken.

The BWAs also occurred during the warmest and, for 2014, relatively wet periods of August and September. Warm weather conditions are not only more conducive to bacterial growth but also degrade the water's disinfectant residual carried out from the WTP more quickly. Longer residence times, biofilms, and tuberculation also contribute to disinfectant residual degradation. Warm wet weather conditions also allow water contaminated with bacteria to pool around piping with leaks and breaks.

Process for Issuance and Cancelation of a Boil Water Advisory

There are a number of conditions that can trigger BWAs. This includes the following:

- Bacteria Monitoring Detections
- Bacteria Standards Violations
- Treatment System Failures
- Waterborne Disease Outbreaks
- Loss of System Pressure
- Water Main Breaks
- Other Interruptions in Service

The Department of Environmental Quality (DEQ) has developed a policy and procedure regarding BWAs to help guide staff, provide consistency, and maintain public health. A PDF of Policy and Procedure No. ODWMA-399-022 is being forwarded with this briefing paper.

BWAs may be self-initiated by the water system, issued collaboratively in consultation with the DEQ, or when necessary mandated by the DEQ. Requesting customers to boil the water when bacterial contamination has occurred provides an added barrier of public health protection.

The BWAs that recently occurred in the city of Flint were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the city of Flint collaboratively in consultation with the DEQ.

Current regulations regarding monitoring and standards for bacteria in water distribution systems were developed by the U.S. Environmental Protection Agency, have been in effect since 1990, and were incorporated into the Michigan Safe Drinking Water Act, 1976 PA 399, as amended. There are a variety of bacteria, parasites, and viruses that can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, water systems test for total coliform and *E.coli*. Total coliform bacteria react to water treatment in a manner similar to many pathogens. Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system minimizes the likelihood that pathogens are present. *E.coli* is itself a pathogen, and its detection would be direct evidence of a health risk.

Once a BWA has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Using the most common analytical method, samples must be incubated for a period of 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a BWA. Adding each of these steps together, a normal response period to cancel a BWA under these circumstances would be expected to take at least 3 to 4 days.

Recent History of the City of Flint Water System

Historically, the city of Flint had been a customer of the Detroit Water and Sewerage Department (DWSD) while simultaneously maintaining the Flint WTP to provide emergency backup service using the Flint River. The WTP performed quarterly test operations to maintain readiness and was utilized twice in 2009, supplying water once for 2 days and the other for 3 days.

In April 2013 the city of Flint notified the DWSD that it would be terminating service in the future and contracting for raw water service from the Karegnondi Water Authority (KWA). Work on the KWA pipeline from Lake Huron broke ground in June 2013 and is expected to be completed with connection in late 2016.

In August 2013 Rowe Professional Services Company completed an engineering proposal for improvements to the Flint WTP that would allow continuous operation of the WTP utilizing the Flint River in lieu of continuing service from the DWSD until completion of the KWA pipeline. In March 2014 the city of Flint entered into a Consent Agreement with the DEQ regarding the Flint WTP's lime sludge facility. In April 2014 the DEQ issued a construction permit for improvements to the Flint WTP. On April 25, 2014, the city of Flint began continuous operation of the WTP, using water from the Flint River and discontinued the purchase of water from the DWSD.

A BWA was issued for August 15-20, 2014, for a portion of the city of Flint due to localized detections of total coliform and *E.coli* bacteria. Another BWA was issued for September 5-9, 2014, due to localized detections of total coliform bacteria in the same and adjacent portions of the city of Flint. The advisory covered an area of approximately six square miles. The city of Flint has a total land area of just over 34 square miles.

While many of the BWA contributing factors listed above require long-term solutions, the city has taken operational steps to limit the potential for a BWA to reoccur. The city has increased flushing of water mains to limit residence time, maintain disinfectant residual, and help remove buildup and deposits within the piping. The city is boosting chlorine disinfectant residual at locations in the distribution system as needed. The city continues to investigate water leaks and water main breaks and the status and condition of system valves.

Prepared by: Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
Department of Environmental Quality
October 1, 2014

Utility Aeration Mtg notes

Tues 9/30/14

First MTG

Aug 21st Journal Article to

↓ TTHMs

w. Utility Savvy

post-treatment aeration – either at POE or in targeted areas of system → not a new technology

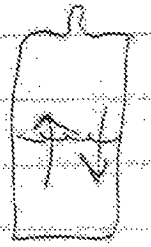
↓ help w. TTHMs not HAA5s

First does CO_2 as pH adj

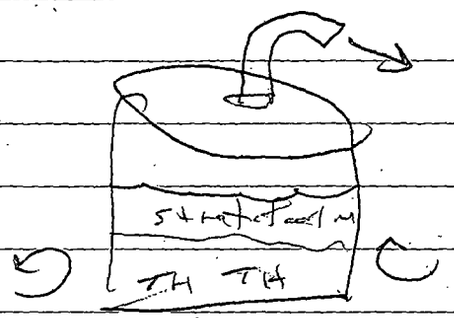
3+ yrs

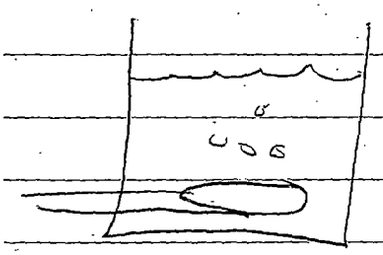
6 B.BBIe/ surface stripx aeration

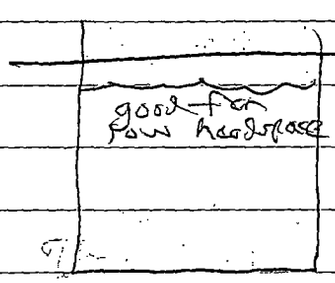
Henry's Constant – Chloroform most volatile

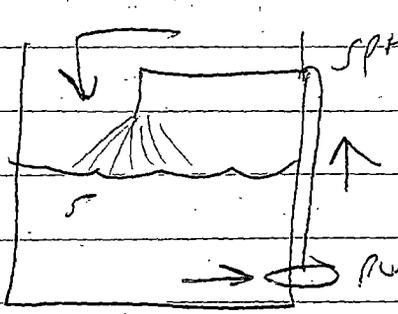


= is the driving force for aeration







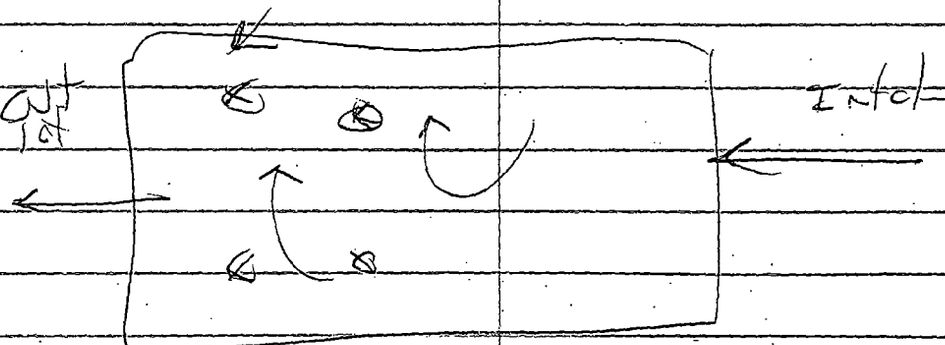


Droplet Distr.
Mixing intensity
Air Handling
Fluid Modeling

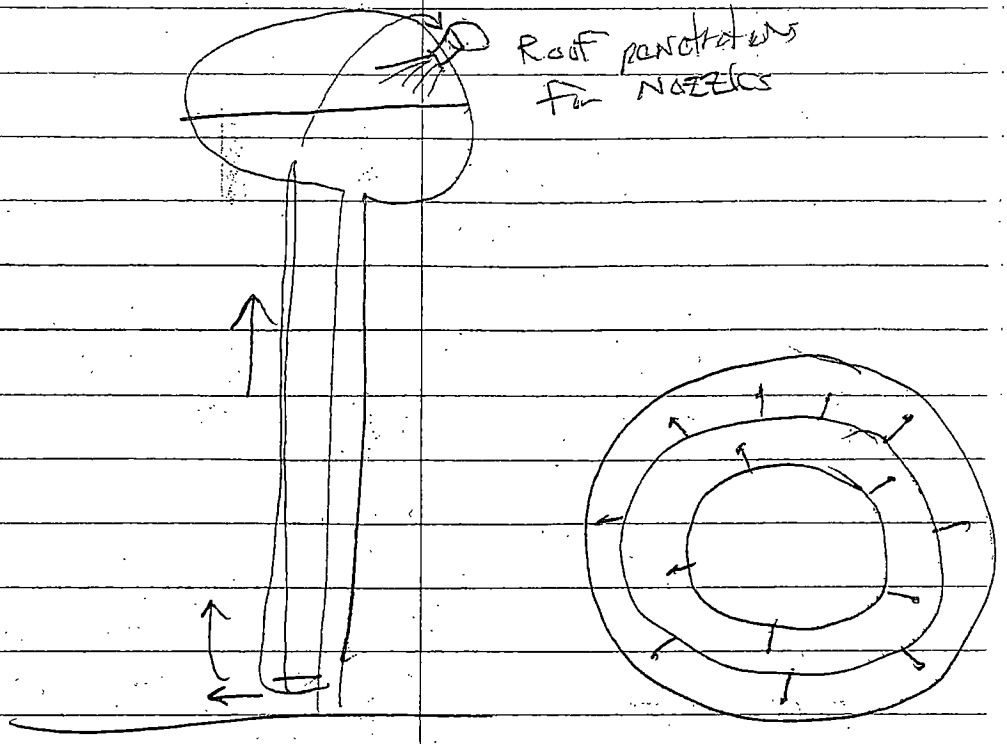
Generates a load of heat
small droplets are better
Big drops not as efficient transfer
But disturb the surface better

Electrink — SPRAY / Misty — is Rack

G-Sto — Surface Aeration
— Not as subject to clogging
Add mixer too



TRS Monitor → Data Logg & Monitor
Current Draw (Range) — alarm if falls out of Range
→ Filtration of Air — options Avail



Prelim Designs

EIO Tank →	63	Spray Nozzles	50%
Cedar	12	Surface Aerator	75%
W-5 (MAK)	4	Surface Aerator	45%
DART	17	Surface Aerators	75%

Clearwell Treatment

Final Thoughts

- water Make
- Taste (stay @ Clearwell)
- ATM MAK removals

we want

Write-up RFP

have info other on stage

Cost for Hemlock - ?
could be 10-12 M if
needed & all facilities
can spread out the costs
talk to Duffy on what's avail. in Budget

Start @ Clearwell then
Expand to other facilities

* Must have hi/lo mode calibrated
& accurate to eval. O&M.
benefits when working on C.S/
W.S

(is it more cost effective to
pump str. to DART & treat than
vs. clear well & O&M. storage)

CORTEZ

Directive Mtg notes

Mon Oct 6th Director Mtg

1. Why is Flint in State?
2. What happens in MI NOW?
3.

↓

TTHM - EM office
Engaged?

Steps need to be proactive

- City council looking to do Analysis w. OWD
- Sched. Briefing w. EM
  - opens - Go back
    Go Back & Clean
    react
    Nothing
  - need to be proactive on city
    Power to DN
- Mtg. w. EM
  - then ~~reorg~~ to wk on
    Assess & Announce on Plan

Gov. Needs Briefing on Flint Situ.

– BWA – Address it

Support • Source? Cause – evidence of contam.
if e.coli – direct evid. of
1st – yes (e.coli) sewage contam.
2nd – No (e.coli)

Summary

– ✓ old systems – large/old pipes
✓ flow (low)
✓ stagnation
✓ fluctuation
– Biofilm – less effective Cl2 residuals
– corrosion/urban renewal / bad flushing / breaks
– coliform → Evidence of contam.

1½ days

Need 2nd? → Process of issuing a BWA?

✱ – self initiated by CWS
– DEQ – results – other BWA is necessary
who made the call wrt Flint → collective
hit 5% RCE → LCR for sampling 30 days
But E Coli → 24 HR notice

✱ For Total Coliform std → EPA → adopted by MI.
Back in 92 → if hits trigger → state has
authority to act. BWA / → self
or collective
We have policy on issuance of BWAs

✱ lifted → corrective meas. Necessary
confirmatory samples – 25 to 24 hrs apart
if U/O MCL
1 set if ✱

– Spelled out Monitoring Requirements
For dist system

History — switched on 4/25/14 from DWSD

Met w. gov. 2013 (AIRC) — Flint wanted to use Flint River & Appeared to pull away from DWSD & BC on Lake Huron by 2016

Last issue

MGT of WTP → Pot. for further BWAs?

Top soil July-Sept ↑ inc. of TCR vios

- warm conds
-
- Mid next week (Next Tues)

* Public Relations — Bill White - Leads Matt Foundations

Concerns/mistrust wrt water system.

Is it safe?

Ability to manage problem

Likelihood to happen again

3rd party verification — willing to hire 3rd party!

Was it correct decision to leave DWSD?

Summarize up to this point

Stoke work w. leads on WQ

Stac add → Add. staff. Matt called DC to help out in dist. system → Invest in maint. to help support the local comm.

Service lines (lead) —

Briefing Message to Gov

Current situ

Process

History

↓

Summ. w. 3 points

1. Ensuring safe DW
   - Protection w. Flint-Del
2. Engage locals

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

September 10, 2014

Mr. Brent Wright
City of Flint Water Treatment Plant
4500 North Dort Highway
Flint, Michigan 48505

9/10/14
TTHM OEL
Exceeds MCL

SUBJECT: Compliance Communication
Total Trihalomethane Operational Evaluation Requested

Under the Stage 2 Disinfectants and Disinfection Byproduct Rule, the City of Flint has been required to collect samples for the analysis of Total Trihalomethane (TTHM) and Haloacetic Acids (HAA5) at eight sites within the City's water distribution system. The City has completed two quarterly monitoring periods since changing its source water to the Flint River effective April 25, 2014.

Normally an Operational Evaluation Level (OEL) would be calculated in accordance with the Michigan Safe Drinking Water Act, Public Act 399, 1976, as amended, Administrative Rule 7196 (R 325.107196), each quarter once three quarters of results have been obtained and compared with the respective maximum contaminant level (MCL) for TTHM. Normally the calculation would be made as follows:

(2 x current quarter + sum of 2 previous quarters) divided by 4

As the City of Flint currently has only two quarters of data, the calculation has been modified as follows:

(2 x current quarter + previous quarter) divided by 4

The resulting OEL for each site is listed in the table below. All results are in parts per billion (ppb):

	TTHM			HAA5		
	5/21/14	8/21/14	Mod. OEL	5/21/14	8/21/14	Mod. OEL
DBP1 McDonalds 3719 Davison	162.4	145.3	113	64	43	38
DBP2 Liquor Palace 822 S. Dort Highway	111.6	112	84	52	40	33
DBP3 North Flint Auto 3302 S. Dort Highway	96.5	127.2	88	48	31	28
DBP4 University Market 3606 Corunna	106.4	181.3	117	55	24	26
DBP5 B&P Gas Station 2501 Flushing	75.1	196.2	117	38	17	18
DBP6 Salem Housing 3216 MLK Boulevard	82.2	112.4	77	41	25	23
DBP7 Kroger 5018 Clio Road	88.2	144.4	94	49	30	27
DBP8 Taco Bell 6204 N. Saginaw	79.2	118.3	79	50	37	31

Briefly Message to Gov

Current sitx

Process

History

↓

Summ. w. 3 points

1. Zoning site Dw
2. Procedure w. Plat - DEL
3. Engage locals

As shown in the table above, even with this less restrictive modified method, six of the City's eight sites already exceed the OEL limit of 80 ppb for TTHM. In addition, the City's two other sites are both more than 95% of the TTHM OEL limit.

The MCL for TTHM and HAA5 is based on a locational running annual average for each site, essentially the average at each site over the four previous quarterly monitoring periods. However, with TTHM levels of this magnitude, it is likely the MCL will be exceeded for at least one of these eight sites from just three quarters of monitoring results. For TTHM, four quarters at the MCL of 80 ppb (4 x 80) would provide 320 ppb allowable. As an example, site DBP1 through just two quarterly monitoring periods has a total of 307 ppb (162+145), leaving only 13 ppb over two more quarterly monitoring periods to maintain compliance with the MCL.

Therefore, this office is requesting the City of Flint complete an Operational Evaluation in accordance with Administrative Rule 719l (R325.10179l). The Operational Evaluation Report shall be submitted to this office no later than November 28, 2014. The report shall not be limited in scope and shall include the following:

Examination of Treatment Operational Practices
- Changes in source water quality
- Treatment changes
- Storage tank operations
- Excess storage capacity
- Treatment problems that contribute to TTHM formation

Examination of Distribution Operational Practices
- Storage tank operations
- Excess storage capacity
- Distribution system flushing

The report shall also include steps the City could consider to minimize future exceedances.

Additional guidance on completing the Operational Evaluation Report, including a number of forms that can be used to gather and evaluate water system information is provided in the United States Environmental Protection Agency's (U.S. EPA) Operational Evaluation Guidance Manual. This document is available on the U.S. EPA's website at the following link:

http://www.epa.gov/ogwdw/disinfection/stage2/pdfs/draft_guide_stage2_operationalevaluation.pdf

Be advised, failure to submit an Operational Evaluation Report by this deadline is a reporting violation subject to Tier 3 Public Notification.

The OEL is an indicator of operational performance. The water system must take proactive steps to be able to comply with the MCL's for TTHM and HAA5. While it is recognized that removal of Total Organic Carbon disinfection byproduct precursors as part of the treatment process has performed above minimum removal requirements under the treatment technique, around 4 parts per million of organic carbon are still present in the treated water and may be leading to additional TTHM formation in the City's distribution system.

While health effects associated with disinfection byproducts contaminants are based on chronic exposure, the City has available alternatives that must be considered to achieve compliance with this drinking water public health standard.

History — switched on 4/25/14 from OWSD
met w/ gov OOD (Airl) — Pint wanted to use Pint River & agreed to pull away from OWSD & be on Lake Huron by 2016

Last time
MGT of WTP → p.t. for further BWAs?

Tap fee July-Sept ↑ end of TCR visit
= warm cust.
=
- mid next week (Next Tues)

* Public Relations — Bill white - local Matt Foundations
Concerns/restrict WRT water system.
IS IT SAFE?
Notify to merge problem
Likely to happen again
3rd party verification
Will it cancel decision to leave OWSD?
willing to hire 3rd party

Summarize up to this point
Steve will work on MQ
Steve add → Add stuff matt called DC to help out in cust. system → invest in maint. to help support the local economy
Service lines (lead) —

If you have any questions regarding this information, please contact me at the number below.

Sincerely,

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and
Municipal Assistance
Lansing District Office
(517) 290-8817

cc: Mr. Darnell Early, City of Flint
Mr. Daugherty Johnson III, City of FLint
Mr. Howard Croft, City of Flint
Mr. Robert Bincsik, City of Flint
Ms. Liane Shekter Smith, P.E., DEQ
Mr. Richard Benzie, P.E., DEQ
Mr. Stephen Busch, P.E., DEQ
Genesee Co. Health Dept.

Gov. needs ● acting on First ●.

— BWA – Does it

Current • Source ? case – evidence of custom.
if exist – date end of
1st – resolution source custom.
2nd – no cancel)

Summary

- ✓ Old system – large/old HO
- ✓ Flow Chart
- ✓ Explanation
- ✓ Duplicate
- Brattain – case affecting CL residents
- Greater/when renewal / authority/ants
- Action → Evidence of custom.

1½ pgs

Prior 2nd ? → Process of issuing a BWA ?

- ✱ – self-initiated by CWS
  – Dec-results — attn BWA is necess.

Cole made the call with First → collective

Ht 6% RCD → (N for spec. long 30 days yr
But ∈ Col. → 24 hr notice

- ✱ Re Ft Thel Status → EPA → adopted by MEI.
  Back in 92 → if Cols to issue → State has
  authority to attn. BWA / → staff or collective
  use Lee policy on issuance of BWAs
- ✱ Ifted → corrective mess. news
  Confirmatory/ supplier — 2 sets 24 hrs apart
  if w.o. MCL
  1 set if ●

– Spelled out Monitoring Reqs
For dist system

Updated cost estimates - July 2011
from April 2009 Project PLAN

City of Flint
DWRF Overall Cost Opinion Summary
July, 2011

ROWE PROFESSIONAL SERVICES COMPANY

CONSTRUCTION COST ESTIMATE

ITEM				AMOUNT	Project #
Torrey Road Booster Station Improvements				$ 241,000.00	- 1008
Cedar Street Improvements				$ 812,000.00	- 1007
24 Inch Water Main Improvements				$ 12,000,000.00	
TOTAL				$ 13,053,000.00	

→ combo of portions of projects 2009 & 2010
See ROWE, INC's 8/29/2011 letter included

Torrey Road Booster Station
Proposed Pump Improvements
July, 2011

ROWE PROFESSIONAL SERVICES COMPANY

Project 1008

CONSTRUCTION COST ESTIMATE

ITEM	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
Booster Station Improvements				
Pump #1 Demolition	1	LS	$ 4,000.00	$ 5,000.00
Pump #2 Demolition	1	LS	$ 5,000.00	$ 5,000.00
6" Butterfly Valve	1	EA	$ 3,000.00	$ 3,000.00
12" Butterfly Valve	1	EA	$ 4,200.00	$ 4,200.00
8" Butterfly Valve w/ electric operator	1	EA	$ 12,000.00	$ 12,000.00
12" Butterfly Valve w/ electric operator	1	EA	$ 16,000.00	$ 16,000.00
8" Gate Valve	1	EA	$ 2,400.00	$ 2,400.00
12" Gate Valve	1	EA	$ 3,600.00	$ 3,600.00
40 Hp Split Case Pump	1	EA	$ 28,000.00	$ 28,000.00
60 Hp Split Case Pump	1	EA	$ 36,000.00	$ 36,000.00
Ductile Iron Piping, CL 53	1	LS	$ 4,000.00	$ 5,000.00
Concrete Pedestals	1	LS	$ 5,000.00	$ 5,000.00
Painting	1	LS	$ 2,500.00	$ 2,500.00
Cleanup and Restoration	1	LS	$ 3,000.00	$ 3,000.00
Electrical Upgrades	1	LS	$ 36,000.00	$ 36,000.00
SUBTOTAL				$ 166,700.00
CONSTRUCTION CONTINGENCY (20%)				$ 33,300.00
DESIGN / CONSTRUCTION ENGINEERING (25%)				$ 41,000.00
TOTAL				**$ 241,000.00**

Cedar Street Pump Station
Proposed Improvements
July, 2011

ROWE PROFESSIONAL SERVICES COMPANY

Project 1007

CONSTRUCTION COST ESTIMATE

ITEM	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
Cedar Street Improvements				
Cutler-Hammer Equipment including	1	LS	$ 500,000.00	$ 500,000.00
Switchgear and starters				
Pad Mount Transformer				
Generator connection box				
Arc Flash Study				
Installation of Switchgear, transformer, conduit/wire, misc	1	LS	$ 50,000.00	$ 50,000.00
Demo of existing gear, battery rack, conduit/wire	1	LS	$10,000	$ 10,000.00
SUBTOTAL				$ 560,000.00
CONSTRUCTION CONTINGENCY (20%)				$ 112,000.00
DESIGN / CONSTRUCTION ENGINEERING (25%)				$ 140,000.00
TOTAL				**$ 812,000.00**

24-inch WM
Engineers Cost Opinion
July, 2011

ROWE PROFESSIONAL SERVICES COMPANY

CONSTRUCTION COST ESTIMATE

ITEM	ESTIMATED QUANTITY	UNIT	UNIT PRICE	AMOUNT
REMOVAL ITEMS				
TREE, REM, 6 INCH TO 18 INCH	EA	60	$ 300.00	$ 18,000.00
TREE, REM, 19 INCH TO 36 INCH	EA	10	$ 800.00	$ 8,000.00
REMOVE TREE, 37 INCH OR LARGER	EA	10	$ 1,000.00	$ 10,000.00
PAVT, REM	SYD	28500	$ 4.00	$ 114,000.00
REMOVE CURB AND GUTTER	FT	7200	$ 4.00	$ 28,800.00
REM HYD ASMBLY	EA	5	$ 450.00	$ 2,250.00
REM WM	FT	$10,000	$ 7.00	$ 70,000.00
TRACK, UNENCASED RAILWAY, REM	FT	10000	$ 10.00	$ 100,000.00
ROAD PAY ITEMS				
SIDEWALK, CONC, 4 INCH	SFT	52500	$ 4.00	$ 210,000.00
SIDEWALK, CONC, 6 INCH	SFT	5000	$ 4.50	$ 22,500.00
SIDEWALK RAMP, ADA	SFT	13000	$ 6.00	$ 78,000.00
AGGREGATE BASE, 8 INCH	SYD	20000	$ 7.00	$ 140,000.00
HMA, 3C (BASE, 330#/SYD)	TON	3200	$ 44.00	$ 140,800.00
HMA, 3C (LEVELING, 165#/SYD)	TON	1600	$ 44.00	$ 70,400.00
HMA, 4C (TOP, 165#/SYD)	TON	1600	$ 44.00	$ 70,400.00
PAVEMENT REPAIR	SYD	500	$ 100.00	$ 50,000.00
CURB AND GUTTER, CONC, DET C4	FT	7200	$ 9.00	$ 64,800.00
DRIVEWAY, AGGREGATE	SFT	1000	$ 1.00	$ 1,000.00
DRIVEWAY, HMA	SFT	5000	$ 2.50	$ 12,500.00
DRIVEWAY, NONREINF CONC, 6 INCH	SFT	13500	$ 4.00	$ 54,000.00
DRIVEWAY, REINF CONC, 8 INCH	SFT	1000	$ 6.00	$ 6,000.00
PAVEMENT MARKING PAY ITEMS				
PAVT MRKG, 4 INCH, YELLOW	FT	10000	$ 1.00	$ 10,000.00
PAVT MRKG, 4 INCH, WHITE	FT	10000	$ 1.00	$ 10,000.00
PAVT MRKG, OVLY HOT PLASTIC, 6 INCH, CROSSWA	FT	2000	$ 9.00	$ 18,000.00
PAVT MRKG, OVLY HOT PLASTIC, 24 INCH, STOP BAI	FT	1000	$ 20.00	$ 20,000.00
STEEL POST	FT	1000	$ 5.00	$ 5,000.00
SIGN, TYPE IIIA	SFT	400	$ 25.00	$ 10,000.00
WATER MAIN PAY ITEMS				
ABANDON EXISTING WATER MAIN, IN PLACE	FT	20000	$ 5.00	$ 100,000.00
ABAN GATEWELL	EA	100	$ 450.00	$ 45,000.00
WM, DI, 6 INCH, TD G	FT	800	$ 50.00	$ 40,000.00
WM, DI, 8 INCH, TD F	FT	25	$ 55.00	$ 1,375.00
WM, DI, 8 INCH, TD G	FT	2500	$ 55.00	$ 137,500.00
WM, DI, 12 INCH, TD F	FT	250	$ 70.00	$ 17,500.00
WM, DI, 12 INCH, TD G	FT	150	$ 70.00	$ 10,500.00
WM, DI, 16 INCH, TD G	FT	1400	$ 85.00	$ 119,000.00
WM, DI, 24 INCH, TD F	FT	5500	$ 140.00	$ 770,000.00
WM, DI, 24 INCH, TD G	FT	18500	$ 150.00	$ 2,775,000.00
WM, DI, 30 INCH, TD G	FT	6500	$ 180.00	$ 1,170,000.00

Updated Oct 2011 to 5,800 LF

WM, DI, 30 INCH, BORED AND JACKED	FT	500	$ 250.00	$ 125,000.00
HYD ASMBLY	EA	15	$ 2,500.00	$ 37,500.00
GV AND BOX, 6 INCH	EA	2	$ 750.00	$ 1,500.00
GV AND BOX, 8 INCH	EA	40	$ 950.00	$ 38,000.00
GV AND WELL, 8 INCH	EA	40	$ 2,300.00	$ 92,000.00
GV AND WELL, 12 INCH	EA	10	$ 3,200.00	$ 32,000.00
GV AND WELL, 16 INCH	EA	6	$ 5,000.00	$ 30,000.00
BFV AND WELL, 24 INCH	EA	30	$ 8,000.00	$ 240,000.00
GV AND WELL, 30 INCH	EA	3	$ 10,000.00	$ 30,000.00
CONNECT TO EXISTING WATERMAIN	EA	100	$ 1,200.00	$ 120,000.00
HYDRO STOP VALVE	EA	80	$ 7,000.00	$ 560,000.00
CHLORINATION AND TESTING	LS	1	$ 50,000.00	$ 50,000.00
MAINTAINING TRAFFIC PAY ITEMS				
BARRICADE, TYPE II, HIGH INTENSITY, LIGHTED, OPI	EA	250	$ 50.00	$ 12,500.00
BARRICADE, TYPE II, HIGH INTENSITY, LIGHTED, FUR	EA	250	$ 10.00	$ 2,500.00
BARRICADE, TYPE III, HIGH INTENSITY, LIGHTED, OP	EA	30	$ 100.00	$ 3,000.00
BARRICADE, TYPE III, HIGH INTENSITY, LIGHTED, FU	EA	30	$ 20.00	$ 600.00
LIGHTED ARROW, TYPE B, OPER	EA	2	$ 2,000.00	$ 4,000.00
LIGHTED ARROW, TYPE B, FURN	EA	2	$ 50.00	$ 100.00
DUST PALLIATIVE, APPLIED (CA CL2)	TON	50	$ 200.00	$ 10,000.00
MAINTENANCE GRAVEL	TON	20000	$ 3.00	$ 60,000.00
MINOR TRAF DEVICES	LS	1	$ 10,000.00	$ 10,000.00
PAVT MRKG, TYPE R, 4 INCH, WHITE, TEMP	LFT	1000	$ 0.50	$ 500.00
PAVT MRKG, TYPE R, 4 INCH, YELLOW, TEMP	LFT	2000	$ 0.50	$ 1,000.00
SIGN, TYPE B, TEMP	SFT	1000	$ 7.00	$ 7,000.00
TRAFFIC CONTROL	LS	1	$ 25,000.00	$ 25,000.00
MISCELLANEOUS PAY ITEMS				
AUDIO-VIDEO CONSTUCTION AREA SURVEY	LS	1	$ 12,000.00	$ 12,000.00
MOBILIZATION (5%MAX)	LS	1	$ 450,000.00	$ 450,000.00
RAILROAD COORDINATION	LS	1	$ 5,000.00	$ 5,000.00
CLEANUP AND RESTORATION	SYD	35000	$ 8.50	$ 297,500.00
NON HAZ CONTAMININATED MATERIAL HANDLING &	CYD	4000	$ 50.00	$ 200,000.00
SOIL EROSION AND SEDIMENTATION CONTROL	LS	1	$ 25,000.00	$ 25,000.00
SUBTOTAL				$ 9,012,025.00
CONSTRUCTION CONTINGENCY (20%)				$ 1,787,975.00
DESIGN / CONSTRUCTION ENGINEERING (15%)				$ 1,200,000.00
TOTAL				**$ 12,000,000.00**

Looks from Decs. to DTM on
where to go 4/17/14

No 2 goal — use Flint River as primary source
by April 2014

Some Temp. Plans — WARRON

1. Elec. Rel — By 10800
2. O2 exchange — Gases, Syst

Chem-Q issue — Power to it

11/4/D
Cut making
& meter

— Need info on loose info. for Provisional Back-up
Power

Bary Rd — temp. Line Depend ≤ 30 months.

Middle ground — OPTIONS

1. Full recycle — tankers Land fill
— Passers
— truck out → Flint Rd

2. Partial — DEQ Mtg 2nd-qtr
— Stack sweeping not in old Region
— Saying wells — clean clear on entry Rd

— agreement to draft
— supervisor
* the memo came & said "NO"!

Any options looked at $3.00 NIL

— try bagger — then close if still closed by red
— try risk loss
— entire WC #I — 30 days stop
removed? de-watered?

— what can we do to use Bray Rd
— exceptions under Act 399 to depend on
in flex area → no longer fits Pattie
since space area no longer
* Need to permit under Act 399 as part of
organic project — otherwise CW dock
WRO, sidewalk

Sell

— style slide
— remove soft ant of slide
— bathe bagger
— system ant — NOES or IOR w. city
→ site survey / agree to original
remove soft ant of line
— permit for 30 mo.?

can we do under 399

C.P. for treatment w. softeny

— not to exceed 20 softeny points for 2nd LCL included Brn/Rd results separate

Patient for treatment w/o softeny

If track — patient for treatment w. softeny

P.

Pho 2 - Seq 2 — w/o softeny

Phos - 2 - Seq 2 — w. softeny — incl Brn/Rd

Next wed for Mg w. EM/Exam DA 10:30 to 11:30 AM

Refreshers in city 4/10 on counting KWH p. 95

Lessons 2 and 3 4/19/10 reading

11/13/13 Meeting (Pre-Meeting to MR Only)

Revised Timeline

Set 80% Plans (Pre-Permitting)

11/20/13 Pre-Meeting Meeting with EM

* Need Seismic + Civil Design Work

DRAFT 60 Days Construction *

* Need Low Flow Inlet for Pre-Chlorination to avoid Dry Pre-Chlorination *

We will need

800 gpm Ant. Crude / Stand-by Raw Make to degas

→ Pre-Treatment

Lowest Pt 104.00 GND on Port-C Strategy @ 10 NGD

Trace 95.00 GND @ 10 NGD → Not Term

O3 Storage Design with 30 Days Out of Endangered Plan For Power Failure - Coolers Back 2 Months

Phase 1 Go on Rice 4/1/13

2 Reduced Req'd

3 Evaluate

Phase 2 Turn Around

2 Lakes in Current 30 Days Raise 4.

5 Days If Issue

Valve Gas Act on Gas Act Repl - Feeder?

Need Sch Load Code 339

Jerry Arcos
~Fr. Drake

First Meeting w. Engr

- Does NOEQ matter?
- We have no concept of - but I'm sure it's important

- will NOEQ → run to OEQ
  Enc. CL Bldg

Start of wiring in OEQ / Design Board

Key DN's ?

- Spring - intern - ?
- Is Spring - KWA ?

Shop Room G, no O-lt on Parts
ST Bldg and F Corridor

Sep Panels
- Admin Engrs - Rm
- Comm. Engrs - Rm 8 KWA

Volt
W regs
↑ watts
- Dist. Panel Rm Needed

Why OE - EOAF - CH Lo ? Phase 2 input
Pt Room
Enough G/ room for all

Rm capacity ok
Reserve Loads - Ves

Prysby, Mike (DEQ)

From: Busch, Stephen (DEQ)
Sent: Thursday, May 23, 2013 10:36 AM
To: Shekter Smith, Liane (DEQ)
Cc: Bloemker, Jon (DEQ); Benzie, Richard (DEQ); Donaldson, Kristina (DEQ); Prysby, Mike (DEQ)
Subject: DWSD response on sunk costs and non-contracted rates
Attachments: SKMBT_65213051611350.pdf

Liane,

Attached is the letter from DWSD (Sue McCormick) to Treasurer Dillon regarding stranded or sunk costs and non-contracted water rates to the City of Flint and Genesee County water systems. These were requested by the Governor during the meeting I attended on April 20, though DWSD was supposed to provide actual figures by the April 24 response.

While the DEQ does not involve itself in rate negotiations between parties, continued delays in not having these costs and rates negotiated creates burdens on both sides which places the ability to complete other capital improvement and rehabilitation projects in limbo, creating the potential for compliance issues. Uncertainties regarding the future of the DWSD also add complexity to this situation.

As both the City of Flint and City of Detroit will continue to reside under auspices of emergency financial managers administered by the Treasury Department for the near future, it is hoped that resolutions to these issues can be reached in a timely manner.

We would greatly appreciate it if you and/or Director Wyant could relay these concerns as part of the DEQ's continued discussions with the Treasury Department and keep things moving forward. We of course, will continue to provide any technical assistance they might request.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

CITY OF DETROIT
WATER AND SEWERAGE DEPARTMENT
OFFICE OF THE DIRECTOR

735 RANDOLPH STREET
DETROIT, MICHIGAN 48226
WWW.DETROITMI.GOV

April 24, 2013

Mr. Andy Dillon, Treasurer
Michigan Department of Treasury
Lansing, Michigan 48922

Dear Mr. Dillon:

Regarding: Rate Proposal for Flint / Genesee County

As you are aware, during our meeting on Friday, April 20, 2013, the Detroit Water and Sewerage Department (DWSD) was requested to provide a rate proposal to Flint and Genesee County by today based upon the specifications that Flint provided to DWSD on Monday, April 22, 2013. Early this morning, DWSD responded to that request with several documents that were also provided to your office by electronic communication.

In addition to the proposal document, the State of Michigan requested that DWSD include cost figures concerning DWSD's stranded costs associated with capital investment made by DWSD over the years related to serving both Flint and Genesee County as water customers. This issue of "stranded costs" has received significant media attention over the past several months, and my impression is that the State was looking for a clear figure so that there could be subsequent discussion and negotiation over all costs associated with Flint's decision on whether to join Karegondi Water Authority (KWA).

As you may know, State law requires that public utilities such as DWSD must base their rates upon the actual cost of service to particular customers. Additionally, state law limits the length of utility contracts to thirty years, while the useful life of capital assets in the water utility can greatly exceed that thirty year term.

Unfortunately, the computation of stranded costs for DWSD's capital investments in capacity and transmission attributable to Flint's and Genesee's consumption of DWSD water, is a complex calculation that cannot be performed with any level of certainty over the short time period provided by the State of Michigan for this analysis. Further, I have been advised by DWSD's General Counsel that it would not be prudent to engage in a process of trying to guestimate a price range for such a complex computation.

Based upon DWSD's termination of Flint's existing water contract last week, DWSD has roughly twelve months to determine the appropriate cost structure for Flint and Genesee's water consumption over the remaining term of their non-contracted water service from DWSD. DWSD will, however, endeavor to finalize the rate impact of the stranded costs by the end of the current calendar year.

Please rest assure that DWSD's computation will be in accordance with State Law which dictates that such rates will not result in a rate structure that would generate a profit for DWSD. Our intent is simply to compute the rates so that costs properly attributable to Flint and Genesee County will not be borne by the remaining DWSD water customers.

Sincerely,

Sue McCormick
Director

xc: The Honorable Rick Snyder, Governor State of Michigan
Ed Kurtz, Emergency Financial Manager, City of Flint
Kevyn Orr, Emergency Financial Manager, City of Detroit
James Fausone, Chairman, Board of Water Commissioners
William Wolfson, DWSD General Counsel
Nicolette Bateson, DWSD Chief Financial Officer

Prysby, Mike (DEQ)

From: Bloemker, Jon (DEQ)
Sent: Thursday, December 13, 2012 12:07 PM
To: Ashford, Stephen (DEQ); Prysby, Mike (DEQ); Busch, Stephen (DEQ)
Cc: Shekter Smith, Liane (DEQ)
Subject: Genesee County Drain Commission - KWA

On December 13th, I received a phone call from John O'Malia, who will be coordinating the efforts between Wade Trim and AE COM for the Genesee County Drain Commission (a.k.a. KWA). The latter firm will be charged with developing the design criteria for the entire project and the preliminary transmission line route selection and the easement surveys. Wade Trim is involved with the intake construction project. The initial design criteria should be available in January or February of 2013. The present intent is to break the project down into several pieces for the actual design, such as having separate design projects for the low lift pump station, transmission line, reservoir, SCADA system(s) and treatment plant. The request for bids for the design work for each portion of the project may be advertised next month. There may be several consulting firms participating in the overall design. Genesee County will request to meet with ODWMA staff to discuss the design criteria early next year.

The city of Flint has provisionally accepted the offer to join the KWA. The city's approval is subject to the subsequent approval by the Department of Treasury. The state's approval (or possible hearings leading to the approval) is expected in January. There may be some opposition by DWSD about Flint participating in the project.

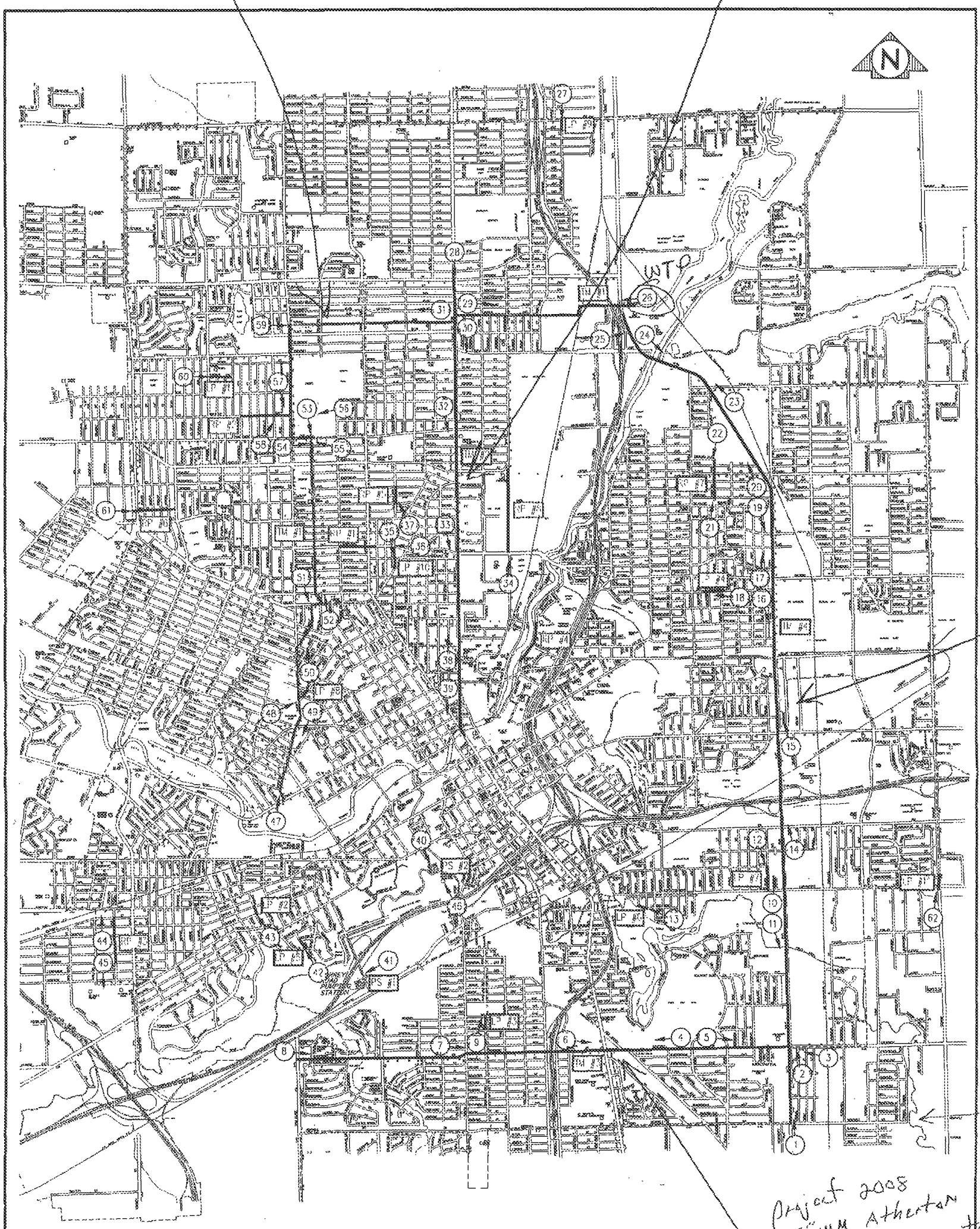
Genesee County has approved the sale of $30 Million of bonds. The county is expecting to obtain a 3% APR for the bonds.

Jon B

24 & 36" trans
WTP to Dupont, south to University

Projects 2009 & 2010

Project 2009
24" WM in Saginaw St.
Flint River to Pierson



Project 2008 & 2009
DORT Hwy
24" & 18"
WTP to Hemphill

Hemphill

Project 2008
18" WM Atherton
from Van Slyke to Dort

DWRF PROJECTS LEGEND

PUMPING STATION IMPROVEMENTS

PS 1 – Torrey Road Booster Station
PS 2 – Water Pumping Station No. 3 Upgrades

TRANSMISSION AND DISTRIBUTION MAINS

M 1	24" Steel from Johnson WTP to Dupont; south to University	~5,800' of 30" ~23,000' of 24" ~1,500' of 16"
M 2	Saginaw St (Flint River to Pierson)	5569 to 5868 24"
M 3	Atherton (Van Slyke to Dort)	5869 16" ~12,600' of 16"
M 4 –	Dort Hwy (24" Steel WM to Hemphill)	~21,000' of 24" ~7,000' of 16"

REPLACEMENT PROJECTS

RP 1 –	Hamilton Ave. (Pierson St. to Hill St. West)	~1,950' of 6"
RP 2 –	Stump Ave. (Dupont St. to Lewerenz Ave.)	~665' of 6"
RP 3 –	Weston St. (Glenwood St. to Augusta St.)	~1,900' of 6"
RP 4 –	Boulevard Dr. (Bonnell to Dupont)	~1,640' of 8"
RP 5 –	Alabama St. (Draper to Bonney)	~1,25' of 6"
RP 6 –	Mack St. (Dort Hwy. to Gaines St.)	~825' of 6"
RP 7 –	Vernon Ave. (Linden St. to Bonney)	~1,550' of 6"
RP 8 –	Bedford Ave. (Hamilton to Lewis)	~1,900' of 12"

DEAD END LOOPING PROJECTS

LP 1 –	Cooper Ave. (Grandon St. to Forest Hill Ave)	~2,250' of 6"
LP 2 –	Trahey St. (Bruce St. to Cambridge Ave)	~325' of 8"
LP 3 –	Brunswick Ave. (Hubbard Ave. to Winthrop Ave)	~250' of 6"
LP 4 –	Illinois Ave. (Arlington Ave. to Vernon Ave)	~425' of 8"
LP 5 –	Kenwood (Dexter to Lincoln St)	~550' of 6"
LP 6 –	Dwight Ave. (E. to Fairbanks Ave)	~325' of 6"
LP 7 –	Avon Ave. (Hopkins Blvd to Pingree Ave)	~250' of 8"
LP 8 –	Talbot Ave. (Mowatt St. to Stevenson St.)	~325' of 8"
LP 9 –	Fenner St. (Carpenter to Bonds)	~400' of 8"
LP 10 –	Beecher St. (Bethune St. to Ann Ave)	~350' of 12"
LP 11 –	Center Rd. (Lippincott Blvd. to Providence Dr.)	~450' of 12"

PHASE LEGEND

PHASE 1 PROJECTS
PHASE 2 PROJECTS

(##) INDICATES PHOTOGRAPH NUMBER AND LOCATION

SHEET 1 OF 1

PREPARED FOR
CITY OF FLINT
D.W.R.F. PROJECTS

PHOTOGRAPH LOCATION MAP

ROWE PROFESSIONAL SERVICES COMPANY
The ROWE Building
540 S. Saginaw St., Ste. 200; P.O. Box 3748
Flint, MI 48502
Ph (810) 341-7500
F: (810) 341-7573
www.rowepsc.com

PLAN DATE: OCTOBER 11, 2011
PROJECT MGR: J.B.M.
REVIEWER: J.B.M.
SCALE: NOT TO SCALE

PLOTTED: 10/11/2011 9:59 AM

Project 2008
& 2009

Lansing District Supervisor
Remediation Division
Mich Department of Environmental Quality
517-335-6228
hallb1@michigan.gov

From: Prysby, Mike (DEQ)
Sent: Wednesday, June 20, 2012 12:57 PM
To: Hall, Ben (DEQ)
Subject: RE: Director's visit to Flint

Ben,

The Flint WTP is available all day...but gave them a heads up that it would most likely be in the early afternoon...I will pass this invite on to our other RMD staff....I expect that drinking water staff will be most interested in the visit.

Michael Prysby

From: Hall, Ben (DEQ)
Sent: Wednesday, June 20, 2012 11:36 AM
To: Prysby, Mike (DEQ); McClellan, Michael (DEQ)
Subject: Director's visit to Flint

We should go ahead and plan on a trip to the water treatment plant and the power plant for the 29th. So we need to determine what staff will be going, what times for the visits and the locations to meet the director. All of which we need to put together an give to the director who will be driving separately to an earlier meeting. We should meet this week once we know who is going and a street address for each visit.

Ben Hall
Lansing District Supervisor
Remediation Division
Mich Department of Environmental Quality
517-335-6228
hallb1@michigan.gov

551.2 Miles

Aggregate Totals for Pipe Sizes	City of Flint, Michigan	
3" .925 Mi.	10,320 LF = 10%	550 Miles total
4" 18.6563 Mi.		
6" 283.295 Mi.	152,000 LF → 10%	
8" 131.162 Mi.	69,200 → 10%	
12" 45.97 Mi.	24,300 = 10%	
14" 7.5 Mi.	3960' = 10%	
16" 22.51 Mi.	11880 = 10%	
18" 11.827 Mi.	6230 = 10%	
24" 21.992 Mi.	11,606 = 10%	
30" 3.065 Mi.	1615 = 10%	
36" 2.1146 Mi.	1114 = 10%	1108' = 10%
Other Sizes:	10" 2.1 Mi.	42" 1460 ft.

Date Received _____
Date Reviewed _____
Reviewed By _____

unit chlorine checklist = spray unit

CHEMICAL ADDITION - PLAN REVIEW CHECK SHEET
(INCLUDING CHLORINE GAS INSTALLATIONS)

Supply Name Flint WSSN 2310 District 11

Design Engineer LAN / Rowe

Well Number _____

Municipality has Approved Plans/Specs:	YES	NO
Chemical Specifications on File:	YES	NO
Project Conforms w/Master Plan/Reliability Study:	YES	NO
PE Seal on Plans and/or Specifications(required):	YES	NO

Number of copies submitted for review: Plans: _____ Specs: _____ Addendum: _____

Location of Chemical Addition (wellhouse, water plant, etc.) _____

AVG DAY Water Usage _____ gals MAX DAY Water Usage _____ gals

Flint unit improvements 2016 Exchange

REFERENCE TEN STATES STANDARDS DURING REVIEW

CHEMICAL ADDITION - CHEMICAL NO. 1

Type of Chemical _____ Product Trade Name _____
NSF Standard 60 approved _____ Conc. _____ Pecent Availability _____
Chemical Manufacturer _____ Chemical Supplier _____

Feeder Type _____ Max Capacity _____ Min. Capacity _____ TDH/PSI _____
Proposed Application Rate/Dosage _____ ppm Max Application Rate/Dosage _____ ppm
Feeder/Pump Sized to Feed in Midrange _____ Feeder Turndown Ratio _____ Adequate _____
Anti-Siphon Devices _____ Back-Pressure Valves _____ Pressure Relief Valves _____
Energized Outlet _____ Flow Switch _____ SCADA Controls _____ Adequate Redundancy _____
Point of Application _____ Chemical Injection Tap _____ Angle to pipe (45 from bottom) _____
Solution Mix/Make-Up/Formula (including dilution factor) _____
Solution Tank: Type _____ Size _____ Graduated _____ Covered _____
Make-Up Water _____ Air-Gap _____ Vented _____ Days Storage _____
Solution Lines: Type _____ Size/Dia. _____ Length _____ Adequate _____
UV Light Resistant _____ Protected _____ Casing _____ Joints _____
Weigh Scale: Type _____ Size _____ Capacity _____ Location _____
Chemical Resistant _____ Readout _____ Adequate _____
Residual Test Equipment _____ Type _____ Standby Feeder _____

CHEMICAL FEED AREA - CHEMICAL NO. 1

Size of Feed Area _____ Adequately Sized _____ Room for Handling Chemicals _____
Feed Area Set-Up _____ Room for all equipment _____ Indivdual Areas for Chemicals _____
Curbing _____ Containment _____ Sumps _____ Sump Cleanouts _____
Grating _____ Barrel Sizes _____ Chemical Deliv. _____ Hand Carts/Ramps _____
Safety Equip _____ Signs _____ Floor Coatings _____ Shower/Eye Wash Station _____

Feed Areas Separate from Controls/Electrical _____ Vented _____ Corrosion _____

Day Tanks: Type _____ Size _____ gal Containment _____
Containment Volums _____ Sumps _____ Adequate _____

Bulk Storage: Type _____ Size _____ gal Containment _____
Containment Volume _____ Sumps _____ Adequate _____
Fill Line Size _____ Vented _____ Vent Size _____ Overflow Size _____

Transfer Pumps: Type _____ Size _____ GPM TDH _____ Controls _____
Manual/Automatic Fill _____ Valving _____ Location of Pumps _____

Comments _____

CHEMICAL ADDITION - CHEMICAL NO. 2

Type of Chemical _____ Product Trade Name _____
NSF Standard 60 approved _____ Conc. _____ Pecent Availability _____
Chemical Manufacturer _____ Chemical Supplier _____

Feeder Type _____ Max Capacity _____ Min. Capacity _____ TDH/PSI _____
Proposed Application Rate/Dosage _____ ppm Max Application Rate/Dosage _____ ppm
Feeder/Pump Sized to Feed in Midrange _____ Feeder Turndown Ratio _____ Adequate _____
Anti-Siphon Devices _____ Back-Pressure Valves _____ Pressure Relief Valves _____
Energized Outlet _____ Flow Switch _____ SCADA Controls _____ Adequate Redundancy _____
Point of Application _____ Chemical Injection Tap _____ Angle to pipe (45 from bottom) _____
Solution Mix/Make-Up/Formula (including dilution factor) _____
Solution Tank: Type _____ Size _____ Graduated _____ Covered _____
Make-Up Water _____ Air-Gap _____ Vented _____ Days Storage _____
Solution Lines: Type _____ Size/Dia. _____ Length _____ Adequate _____
UV Light Resistant _____ Protected _____ Casing _____ Joints _____
Weigh Scale: Type _____ Size _____ Capacity _____ Location _____
Chemical Resistant _____ Readout _____ Adequate _____
Residual Test Equipment _____ Type _____ Standby Feeder _____

CHEMICAL FEED AREA - CHEMICAL NO. 2

Size of Feed Area _____ Adequately Sized _____ Room for Handling Chemicals _____
Feed Area Set-Up _____ Room for all equipment _____ Indivdual Areas for Chemicals _____
Curbing _____ Containment _____ Sumps _____ Sump Cleanouts _____
Grating _____ Barrel Sizes _____ Chemical Deliv. _____ Hand Carts/Ramps _____
Safety Equip _____ Signs _____ Floor Coatings _____ Shower/Eye Wash Station _____

Feed Areas Separate from Controls/Electrical _____ Vented _____ Corrosion _____

Day Tanks: Type _____ Size _____ gal Containment _____
Containment Volume _____ Sumps _____ Adequate _____

Bulk Storage: Type _____ Size _____ gal Containment _____
Containment Volume _____ Sumps _____ Adequate _____
Fill Line Size _____ Vented _____ Vent Size _____ Overflow Size _____

Transfer Pumps: Type _____ Size _____ GPM TDH _____ Controls _____
Manual/Automatic Fill _____ Valving _____ Location of Pumps _____

Comments _____

CHLORINE GAS INSTALLATIONS

CHLORINATOR ROOM

Location of Chlorinator Room In P.S. #4 - NE CORNER NO
Access to Chlorinator Room (Inside/Outside) Outside Panic Hardware on Door Yes ✓
Observation Window Yes ✓ Observation Window in Door Yes ✓ Shatterproof _____
Exterior Switches Yes ✓ Separate Switches Yes ✓ Vandalism Proof _____
Heater _____ Fan Operates before Entering Yes ✓ Air Intake Loc. _____
Air Intake Near Ceiling Yes ✓ Motorized Louvers _____ Airtight Closure on Louvers _____
Switches Operate Yes ✓ (lights, fans, etc.) Exhaust Fan Location _____
Sealed Lights _____ Sealed Switches _____ Sealed Motors _____ at floor loc!
Exhaust Fan Takes Suction near Floor 24" AFF Suction Far Away as Possible from inlet Yes ✓
Air Exchanges X 1/3 Discharge Point _____ Downwind of plant _____
Floor Drains Yes ✓ Ventilation Ductwork _____ Ductwork separate _____
Gas Supply X Vacuum Regulators 1 ea Gas under vacuum Yes ✓
Eductors X Injectors X 1 ea Rotameters (lbs/day) 4 + 1 X 300 lb/day ea
Water pressure _____ Booster Pump needed _____ Booster Pump Location _____
Leak Detection _____ Chlorine Gas Sensors Yes ✓ Alarms Yes ✓ ex-stroy
Repair Kit Yes ✓ SCBA Program Yes ✓ SCBA Storage Locations _____

CHLORINE STORAGE ROOM

Location of Chlorine Storage Room: Pt of Gas Cl Feed

Access to Chlorine Storage Room (Outside Only): No ac. Panic Hardware on Door: Yes (Y)

Observation Window: ctrl. Observation Window in Door: ____ Shatterproof: ____

Exterior Switches: ____ Separate Switches: ____ Vandalism Proof: ____

Heater: ____ Fan Operates before Entering: ____ Air Intake Loc.: ____

Air Intake Near Ceiling: ____ Motorized Louvers: ____ Airtight Closure on Louvers: ____

Switches Operate: ____ (lights, fans, etc.) Exhaust Fan Location: ____

Sealed Lights: ____ Sealed Switches: ____ Sealed Motors: ____

Exhaust Fan Takes Suction near Floor: 24" ± Suction Far Away as Possible from Inlet: Yes

Air Exchanges: X Exhaust Discharge Point: ____ Downwind of plant: ____

Floor Drains: ____ Ventilation Ductwork: ____ Ductwork separate: Yes

Gas Supply: ____ Vacuum Regulators: X Gas under vacuum: Yes

Gas Storage: ____ 150 lb Cylinders: ____ Ton Containers (2000lb.): Yes

Quantity: ____ Restraint: ____ Cylinder Crane: ____

Automatic Switchover on Cylinders: ____ Fail Safe/Shut-Off Devices: ____

Scales: ____ Scale Type: X Scale Capacity: X

Leak Detection: ____ Chlorine Gas Sensors: ____ Alarms: ____

Repair Kit: ____ SCBA Program: ____ SCBA Storage Locations: ____

Trained Personnel: ____ Chlorine Scrubber: Yes Scrubber Capacity: ? X

Comments: ____

Overall Project Conforms to Community Standards and is Approvable? YES NO

Permit Number: ____ Permit Issue Date: ____

capacity of present scrubber? - Air exchanges - 1 air w/ one change per min?

Box of ~~fire~~ : 1 ton Cl_2 & add. gas Cl_2 agap?

- Cl_2 dosage (max) at mgd → lbs/day Gas used?
- Max Cl_2 gas storage ~~fire~~ ton cylinders
- empty expiratory vacuum regulators / Automatic electrolytic injection

@ 18 MGD → 150 max lbs/day

@ 1.0 MM → 150 lbs/day

@ 0.5 MM → 75 lbs/day

2.5 MM → 375 lbs/day

q4c

Q - 10 sheets 4.9 - pg 59

Confirm with SMO P.C

- Cu pipe mat. - sch for secondary coil tubing.
not PVC for dry gas/elemental Hg

STATE OF MICHIGAN CONTRACT NO. 271N3200089

CITY OF FLINT WATER SUPPLY ASSESSMENT

February 2013

For Submittal to:

State of Michigan, Department of Treasury



Submitted by:

TUCKER, YOUNG,
JACKSON, TULL INC.

CONSULTING ENGINEERS-PLANNERS
615 Griswold Suite 600
Detroit, Michigan 48226
(313)963-0612 FAX (313)963-2186

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1. INTRODUCTION

Tucker, Young, Jackson, Tull, Inc. (TYJT), at the request of the State Treasurer performed an analysis of the water supply options being considered by the City of Flint. The City of Flint is presently supplied potable water from the Detroit Water and Sewerage Department (DWSD). This supply is from a single 72-inch water main that terminates at a master meter located at Potter and Baxter. Additionally, downstream of the DWSD master meter, Flint supplies its customer Genesee County. The City of Flint also operates a water treatment plant that uses the Flint River as its source of supply to provide back up and redundancy to the DWSD supply as required by MDEQ

The Karegnondi Water Authority (KWA) is planning on constructing a raw water supply system that could provide Lake Huron water to the Flint Water Treatment Plant. Flint's existing plant would be upgraded to treat the new raw water source.

The State Treasurer has appointed an emergency financial manager for the City of Flint. As such the Treasurer has requested TYJT to provide an analysis of the water supply options to assist the Treasurer in determining any potential risk and the best course going forward for supplying potable water to the City of Flint.

Report Organization

The following sections of this report are described below:

Section 2 – The basis of the analysis is described in this section. The options include the KWA option and several options offered by DWSD.

Section 3 – A significant amount of information and data was collected including memorandums, reports, drawings, financial reports, and other documents. This section summarizes the information used in the analysis.

Section 4 – This section describes the evaluation of the cost of supply for the Flint options. The costs are comprised of the initial cost of operations plus the annual rate of escalation/inflation.

Section 5 – The evaluation process used to analyze the construction costs associated with the KWA supply system is described in this section. Additionally, the cost of financing the capital requirements is described.

Section 6 – This section presents the financial review of the options considered to supply potable water to Flint. A summary of these options is also provided.

Section 7 – In addition to the financial analysis other considerations were identified that should be considered in understanding the risks and determining the best option to supply Flint. They include items related to cost, redundancy and reliability, and Flint's ability to control their future cost of water supply.

2. FLINT WATER SUPPLY OPTIONS

Two water purveyor options were evaluated; the KWA water supply system and continued supply from DWSD. Both suppliers would provide water from Lake Huron as the source. The KWA system is a raw water supply, which means that the water would have to be treated by Flint before distributing the potable water to its customers. The DWSD supply is potable or "finished" water and would not need additional treatment.

Additionally, an option for the Flint WTP to supply the City of Flint without being supplied from either DWSD or KWA was initially considered. The preliminary investigation evaluated the cost associated with the required improvements to the plant and to the Flint River dam system. Although it appeared that this was a viable option, Flint in a meeting on December 20, 2012 with the Treasury, stated that the City did not want to pursue the option and it is no longer being considered.

Karegnondi Water Authority (KWA) Lake Huron Water Supply

The KWA water supply system schematic is shown in Figure 2-1. The system is comprised of an intake in Lake Huron that supplies water to the Lake Huron Pump Station (LHPS). The LHPS lifts the water and pumps it through an approximately 22 mile long 60-inch pipeline. The pipeline terminates at a 5 MG reservoir and is then pumped from the Intermediate Pump Station (IPS) through approximately 26 miles of 60-inch and 18 miles of 30-inch pipeline to the existing Flint WTP. Downstream of the IPS, approximately half way to the Flint WTP, the 60-inch line would also supply a new Genesee County WTP.

The raw water transmission system has a 60 MGD capacity and is sized to deliver a maximum of 18 MGD to the Flint WTP with an average day supply of 12 MGD. Improvements at the Flint WTP would also be required to treat the lake water as the plant is currently designed to treat the Flint River water.

The term of the KWA contract for Flint is 40 years.

Sized @ 18 MGD OR Contract MAY 8 ?
w. Rem to charge contract in Future if needed

KWA App. 20 says 36" main to Flint WTP

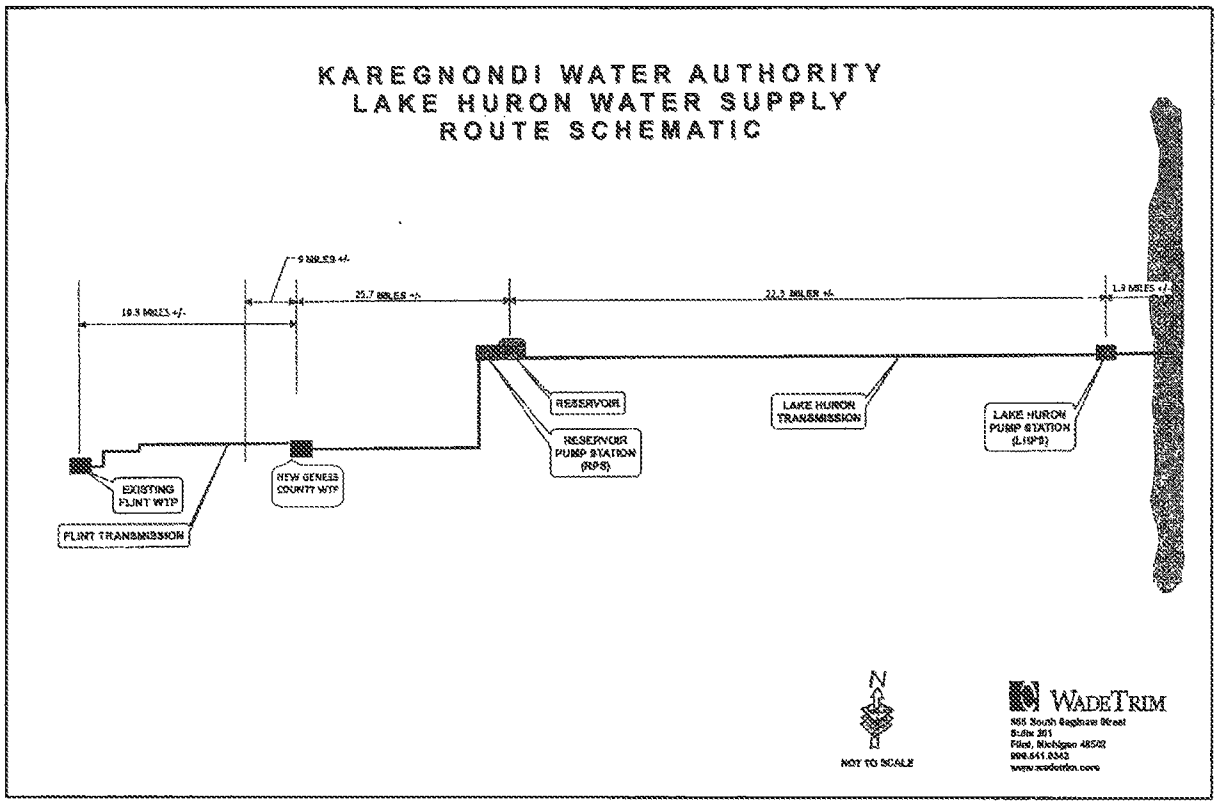


Figure 2-1: KWA Raw Water System

DWSD Water System

The DWSD system schematic is shown in Figure 2-2. Flint is currently supplied by DWSD at Master Meter FL-1, located at Potter and Baxter. Flint typically gets its water from the Lake Huron WTP, located in Fort Gratiot, Michigan; near the Lake Huron shoreline. Water is treated and pumped at the Lake Huron WTP and supplied through a 120-inch pipeline to an intermediate pump station called the Imlay Pump Station. The Imlay Pump Station has 20 MG of reservoir capacity. Depending on the time of year and the DWSD system demand, water is either bypassed directly to Flint or it is re-pumped at Imlay. It should be noted that the DWSD supply to Flint is part of a very large water system and during emergencies or outages water can be supplied from the south up to Flint in lieu of the Lake Huron facility.

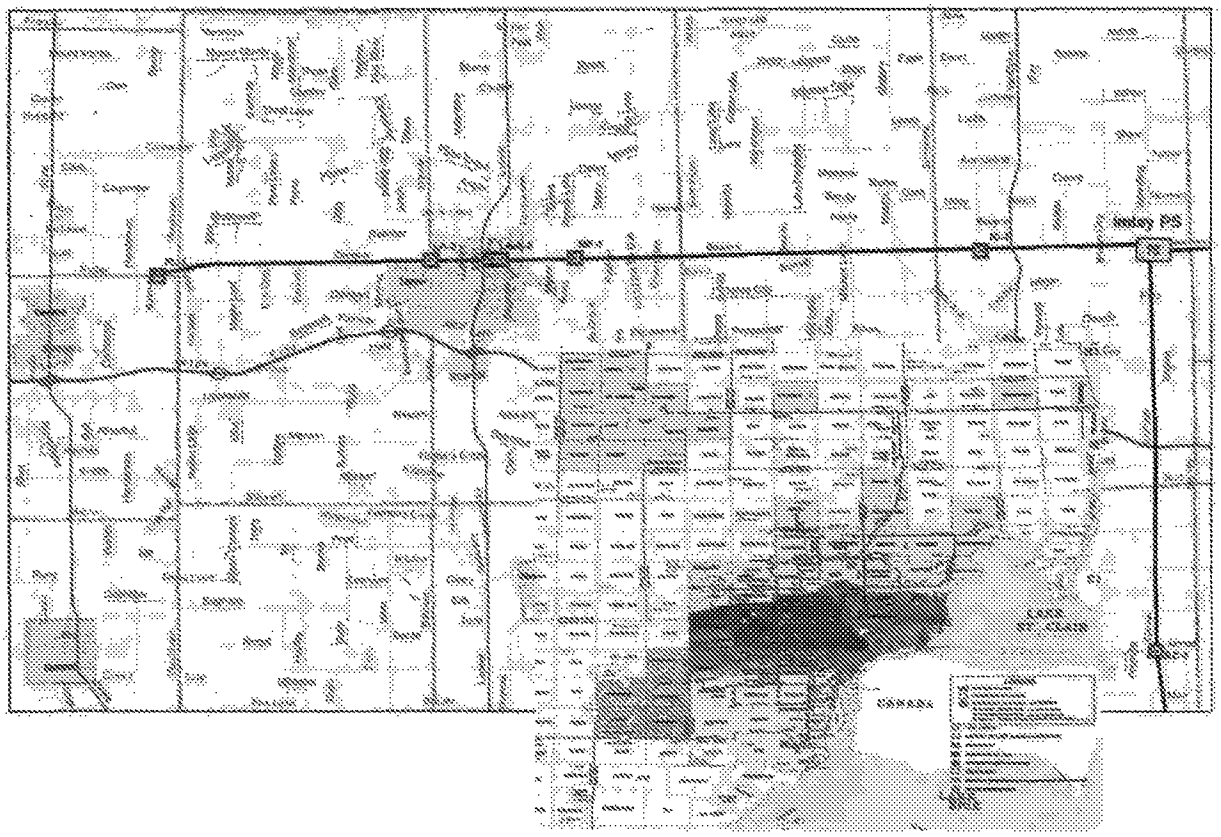


Figure 2-2: DWSD Water System

The pipeline from Imlay to FL-1 is a 72-inch pipeline. It has been estimated that the 72-inch line serving Flint has a capacity in excess of 90 MGD.

DWSD has presented several contractual options to Flint and all of them are based on Flint signing a new 30 year contract. The options shown in Table 2-1 are based on two different supply points; one at the current master meter location FL-1 at Potter and Baxter (P&B) and the other at the location of the Imlay Pump Station. The reason for the varying options is to provide a lower water rate at the Imlay Station, since the DWSD rate formula is based on distance and elevation factors related to the supply location.

The rates are also dependent on the maximum amount of water DWSD supplies. As example, if DWSD supplies a maximum day demand of 18 MGD that would equal the entire amount of water required by Flint.

For the options less than the maximum of 18 MGD means that the Flint WTP would supplement the difference by supplying water treated from the Flint River. These options are known as "blending" and would allow for Flint to blend two sources of water to supply its customers; the Flint River using the Flint WTP and Lake Huron from DWSD system.

18 MGD Maximum Day Customer – FL-1	12 MGD
12 MGD Maximum Day Customer – FL-1	8 MGD
8 MGD Maximum Day Customer – FL-1	8 MGD
12 MGD Maximum Day Customer - Imlay	12 MGD
8 MGD Maximum Day Customer - Imlay	12 MGD

Table 2-1: DWSD Supply Options

3. DATA COLLECTION

During the course of the investigation several documents were used to perform the analysis. The names of the documents are listed below for reference.

KWA and Flint

- Preliminary Engineering Report, Lake Huron Water Supply Karegnondi Water Authority, September 2009;
- Analysis of the Flint River as a Permanent Water Supply for the City of Flint, July 2011;
- Cost Comparison, KWA vs. DWSD, Letter to Mr. Kurtz, October 31, 2012;
- Lake Huron Supply Study, KWA, Appendix 20, October 2012 Preliminary Report Update, Final Report (DRAFT), October 4, 2012;
- Articles of Incorporation of Karegnondi Water Authority, endorsed in 2010;
- Karegnondi Water Authority Bylaws, October 26, 2010;
- KWA Raw Water Supply Contract;
- Flint WTP Statement of Revenues and Expenditures 09' – 12';
- GCDC Division of Water and Waste Services Financial Statements 03' – 11'; and
- Assorted emails with further clarification of questions and documentation.

DWSD

- Historical Rates and Charges to Flint 04' – 13';
- Historical Rates and Charges to Flint with Hypothetical Model Contract 10' – 13';
- 2013 Rates and Charges for the following options:
  - 18 MGD Maximum Day Customer at FL-1;
  - 12 MGD Maximum Day Customer at FL-1 (Flint blending*);
  - 8 MGD Maximum Day Customer at FL-1 (Flint blending*);
  - 12 MGD Maximum Day Customer at Imlay (Flint blending*);
  - 8 MGD Maximum Day Customer at Imlay (Flint blending*); and
- Assorted emails with further clarification of questions and documentation.

* Flint blending based on DWSD supplying two-thirds and Flint one-third of 12 MGD average day demand.

Two meetings were also held; one with DWSD and one with Flint and Genesee County representing KWA. The meetings were held on November 19, 2012 and November 20, 2012, respectively. Minutes from these meetings are included in Appendix A.

4. COST OF SERVICE

Information provided by DWSD, Flint, and representatives of the KWA were used in the cost of service evaluation. To evaluate the annual escalation/inflation rate over the planning period, the rate adjustment for DWSD was estimated based on the recent rate adjustment history. For the KWA system both the estimated cost of operations when the system begins supplying water and the annual rate adjustment or inflation was evaluated. The existing cost of operations and escalation for the Flint WTP was based on actual costs provided and then adjusted depending on the scenario considered. This section describes the evaluation process and the rates used in the analysis.

DWSD Water Supply

The City of Flint has been a customer of DWSD since 1967. The Flint WTP has been maintained as a backup to the DWSD system. As indicated previously, several options were provided by DWSD depending on the type of service Flint was to select. The unit cost of water for each of these options is shown in Table 4-1. These rates are based on DWSD's FY13, which are current until July 2013.

18 MGD Maximum Day Customer – FL-1	12	16.37
12 MGD Maximum Day Customer – FL-1	8	16.31
8 MGD Maximum Day Customer – FL-1	8	12.68
12 MGD Maximum Day Customer - Imlay	12	14.38
8 MGD Maximum Day Customer - Imlay	12	11.11

Table 4-1: Cost of DWSD Supply Options

To determine annual escalation rate, DWSD's last 10 years of history was used along with other large urban water systems in Michigan. The water systems used for benchmarking comparison were: Lansing, Grand Rapids, and Saginaw.

Table 4-2 identifies the annual and average rate of increase to Flint based on supplying water either to the current FL-1 at Potter and Baxter or Imlay. Note the last three years of the rates (FY 2011 through FY 2013) assumes that Flint's cost would be based on the new 30 year contract; FY 2011 being the first year that the new contract was available.

2004	11.06	
2005	10.24	-7.4
2006	10.56	3.1
2007	11.09	5.0
2008	11.35	2.3
2009	13.07	15.2
2010	11.73	-10.3
2011	13.89	18.4
2012	15.08	8.6
2013	16.24	7.7

From FL-1

2004	11.06	
2005	10.24	-7.4
2006	10.56	3.1
2007	11.09	5.0
2008	11.35	2.3
2009	13.07	15.2
2010	11.16	-14.6
2011	12.23	9.6
2012	13.28	8.6
2013	14.32	7.8

From Imlay

Table 4-2: Recent DWSD Water Rates

Audited financial reports were used to determine the rate of inflation associated with other three large municipal systems. The results are shown in Table 4-3.

Lansing	05'-12'	4.6
Grand Rapids	04'-11'	1.6
Saginaw	04'-11'	7.0

Table 4-3: O&M Inflation Rates of Other Large Water Systems

Based on the information analyzed from DWSD and the other communities, it was determined that a fair annual rate of inflation for operations and maintenance cost for the analysis should be 4.4%. The 4.4% has historical significance from Flint's current water supplier and falls within the range of the other communities.

KWA Water Supply

The initial projected O&M cost for the KWA supply would be comprised of KWA's O&M costs as well as Flint's O&M costs. Because there was limited information provided, the initial estimated rate of $1.50/MCF was used. This rate is based on information from the cost comparison analysis attached to the letter to Mr. Kurtz, dated October 31, 2012.

The KWA cost evaluation used an annual O&M inflation rate of 5%. To validate this rate a similar analysis to DWSD's operations and maintenance annual rate of inflation was used. First, in discussions with Flint and the Genesee County Drain Commission (GCDC), they believed that the annual rate of inflation for the new KWA system would be similar to the GCDC Water & Waste Services (WWS). Additionally, two large transmission systems were used to benchmark the inflation rates: the Southeastern Oakland County Water Authority (SOCWA) and the Ypsilanti Utility Community Authority (YUCA). Although both of these systems transmit finished water opposed to raw water, they were considered similar enough for comparison as they are comprised of only large water mains, pumping facilities and storage.

Once again audited financial statements were used to calculate the inflation rates. A summary of the findings are shown in Table 4-4. Based on the fact that the information analyzed showed a large difference between the two systems, it was determined that the KWA assumption of 5% was a good rate of inflation to use in the financial analysis. This rate is almost equally between the GCDC rate and the other two transmission systems.

[illegible]	[illegible]	[illegible]
GCDC WWS	03' – 11'	10.5
SOCWA	04'-12'	–
YUCA	04'-12'	0.7

Table 4-4: O&M Inflation Rates of Other Comparable Systems to KWA

Flint WTP

The Flint WTP currently serves as a backup supply to the DWSD service to Flint. To maintain backup operations, the City of Flint operates the plant approximately 20 days each year. Flint indicated that the average production rate when they operate is 11 MGD.

For the blending options and the KWA supply considered, Flint would be required to operate its plant all year around. Therefore, their operating and maintenance costs were evaluated and adjusted to determine an annual cost associated with year-round operations.

The Flint WTP provided three years of operating costs for the assessment. Additionally, reports listed in Section 3 were also used as reference to determine both operating costs for the plant processing Flint River water (blending options) and Lake Huron raw water (KWA option).

Major cost centers were analyzed to estimate annual operation and maintenance. They included: labor, utilities, chemicals and residual management. In general, as recommended by the Flint plant staff, labor and overhead were increased from the current costs by two-thirds. Additionally, variable costs for power, chemicals and residual cost were increased to estimate full time treatment at the Flint WTP. Data from the KWA Preliminary Report and annual operating data for the Flint WTP (provided separately) were analyzed to make these forecasts.

The annual operating and maintenance costs developed for Flint WTP used are shown in Table 4-5.

[illegible]	[illegible]	[illegible]
Flint River (Blending with DWSD)	4	$5,895,097
Lake Huron (Supplied by KWA)	12	$7,913,118

Table 4-5: FY 13 O&M Costs for Year-round Operations

It was determined that a fair annual rate of inflation for operations and maintenance cost for the Flint WTP plant should be 4.51%. The 4.51% is an average of Lansing, Grand Rapids and Saginaw facilities.

Flint ADD For May Month ?

5. CAPITAL REQUIREMENTS

Large capital investments would be required by Flint and GCDC to construct the KWA supply system. Furthermore, some of the options presented by DWSD (supply point from Imlay) would require the purchase by Flint of DWSD's 72-inch water main. Performing the financial analysis; therefore, required an analysis of the KWA construction cost estimate for the transmission system and Flint WTP improvements.

Revenue bonds were also identified as the source of financing the new supply system and associated improvements. This section describes the assumptions made and the interest used for financing the improvements.

KWA Supply System

The most current cost estimate of the KWA system was presented in the document titled; Lake Huron Supply Study, KWA, Appendix 20, October 2012 Preliminary Report Update, Final Report (DRAFT), October 4, 2012. The cost of construction is estimated at $272,421,558. Flint's portion would be 30% or $81,726,467.

Due to the significance of this expenditure, a detailed review of the cost was performed and is presented in this section. The analysis was performed based on the main elements of the supply system: the lake intake, the two pumping stations, and the transmission pipeline. Additionally, an analysis was performed related to construction contingencies and other costs such as engineering, legal, and administration.

Lake Intake

KWA representatives indicated in a meeting in November that the design documents for the intake were at 90% and that it was planned for advertisement in January 2013. A summary of the estimate is shown in Table 5-1.

[illegible]	[illegible]
Intake and Crib	$22,076,850
ELAC at 25%	5,519,213
Property	2,300,000
Total	**$29,896,063**

$ 24.6 B.D

Table 5-1: KWA Intake Cost Estimate

Based on the evaluation, it appeared that the cost estimate was reasonable. Given that the design was nearly complete, the engineering, legal, administration, and construction contingencies (ELAC) at 25% were also found to be appropriate.

Pumping Stations

KWA representatives indicated that the pump stations were estimated at a level of design less than 15%. Therefore, in addition to an evaluation of their cost estimate, other water pumping station costs were used for comparison. Additionally, contractors were also contacted for costs. Table 5-2 summarizes the KWA cost estimate compared to our cost estimate performed for the Treasury.

	KWA Estimate		Treasury Estimate
Pumping Stations	$24,618,080		$54,573,314
Land for Intermediate Pump Station and Reservoir	--		75,000
Subtotal	$24,618,080		$54,648,314
ELAC for Construction	25% 6,154,520	30%	16,394,494
Total	$30,772,600		$71,042,808

Table 5-2: Pumping Stations Cost Estimate

Two things to note regarding the difference in the cost estimates; firstly, there is a large difference in the cost estimates of the pumping stations. The estimate developed for the Treasury used several other pumping stations construction costs from Southeastern Michigan and discussions with contractors. These costs were then computed on a $/MG's for comparison.

Secondly, our estimate for the Treasury is based on an ELAC of 30% instead of KWA's 25%. Although 25% was acceptable for the intake, it is believed to be too low for the pumping station estimate given that the engineering effort is less than 15%.

Transmission Main

Although the specific route for the transmission main was not provided, an estimate was calculated based on the general information provided. Once again, the KWA estimate was based on a level of design less than 15%. The estimate performed for the Treasury used the line items provided by KWA for the pipeline and also consulted with contractors to evaluate the cost of construction. The comparison is shown in Table 5-3.

Although the cost of construction of the pipeline is similar, a value of 30% was used for ELAC due to the level of design. Additionally, KWA did not believe there would be any additional costs for easements; however, this did not seem practical. Therefore an estimate for acquiring the easements was added to the Treasury estimate and is based on the 277 easements identified by KWA. The cost shown includes surveying, legal, engineering, administration, etc.

Transmission Mains		$166,202,316		$167,419,530
ELAC for Construction	25%	41,550,579	30%	50,225,859
Subtotal		$207,752,895		$217,645,389
Easements		-		1,166,170
Total		**$207,752,895**		**$218,811,559**

Table 5-3: Transmission Pipeline Cost Estimate

Other KWA Costs

In prior estimates of the construction cost, KWA used an ELAC of 37%. In this case it could be considered that the engineering effort associated with the design would have been included. However, it is believed that KWA's reduced ELAC of 25%, does not include the design effort. Additionally, it would be prudent to assume that the owner would want a construction manager during construction of this large project. A summary of these costs are shown in Table 5-4.

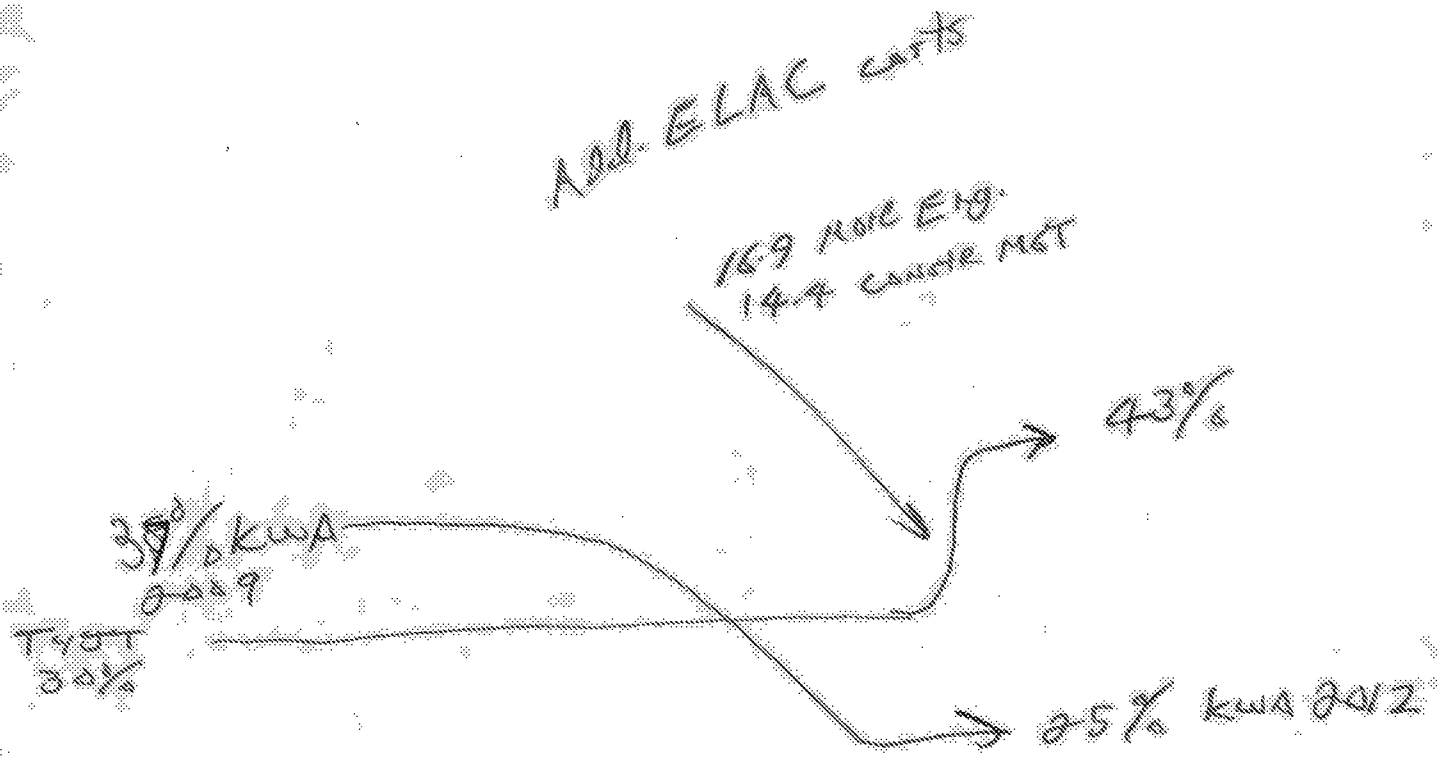
Design Engineering for Pumping Stations and the Transmission Pipeline	$16,939,581
Construction Management at 5%of Project Cost Estimate of $217,645,389	14,434,609
Administration	349,440
Legal, Easements, Contract Documents	831,000
Total	**$32,554,630**

Table 5-4: Other Costs

Summary Comparison

A summary of the two cost estimates are shown in Table 5-5. Based on the comparison, the estimate performed by TYJT shows a higher cost to Flint by approximately $25,000,000.

Note that there are two other costs shown in the summary that were not previously addressed; power and backup power. Regarding the cost of providing power to the pumping facilities, the cost of $4,000,000 appears reasonable.


Add. ELAC units
KG-9 non Eng.
14-4 Cable net
43%
35% KVA
0.9
T150T
30%
35% KVA 0.12

The KWA has repeatedly indicated that backup power is not needed. Backup power is a standard practice in the water industry. Furthermore, a loss of power at either pumping facility will prevent the supply of water to both Flint and Genesee County. For these reasons, the cost of providing backup power was included in our estimate for the Treasury.

Description	KWA Estimate	DWSD Estimate
Intake/Crib	$ 27,596,063	$ 27,596,063
Pump Stations	30,772,600	71,042,808
Transmission Mains	207,752,895	217,645,389
Power	4,000,000	4,000,000
Redundant Power for PS		1,273,200
Land for Lake Huron Pumping Station	2,300,000	2,300,000
Design Engineering/PS and Transmission		16,939,581
Construction Management		14,434,410
Administration		349,440
Legal/Easement/Contract Documents		831,000
Easements		1,166,170
Total	**$ 272,421,558**	**$ 357,578,060**
Flint Share at 30%	**$81,726,467**	**$107,273,418**

Table 5-5: Total Cost Comparison

Flint WTP Improvements

The KWA analysis identified capital costs required to convert the existing WTP from river water treatment to treating lake water. The cost estimate was identified as $7,100,000 in the 2009 report. This number was used in the our analysis, since additional information was not provided. For the purpose of the financial analysis; however, the $7,100,000 was increased by 3% each year for three years to account for inflation.

DWSD Imlay Station Supply Options

The options identified by DWSD to supply service to Flint at the Imlay Pump Station would require Flint to purchase the 72-inch water main from Imlay to Master Meter, FL-1. The pipeline is approximately 25 miles long. The estimated cost provided by DWSD for estimating purposes is $4,700,000.

Financing

The cost of financing the revenue bonds for the capital work was investigated. Based on conversations with local financial advisors knowledgeable in bond financing, an interest rate of 5% for the 25 year

period was considered acceptable. This is based on a Standard and Poor's bond rating of A without insurance.

Additional costs associated with the bond include the reserve and bond issuance fee. The bond holders will require a reserve of approximately 10% of the loan to be held for the 25 year payment period. The cost associated with the bond issuance has been estimated at 2.25% of the principal borrowed for the KWA project and 3% for the smaller loan associated with the Flint WTP improvements or the purchase of the 72-inch main.

Furthermore, since no revenue will be generated to pay on the bonds for the first three years that the system is being constructed, the cost associated with capitalizing the interest was also included.

Finally, interest on the reserve will be provided back to KWA and Flint. Although the interest is currently less than 1%, it was determined that a 3% rate would be more prudent long-term.

DWSD options laid out

6. FINDINGS

Using the information described in the previous sections, a cost evaluation was conducted for the KWA supply and the DWSD options. Individual worksheets for each option are provided in Appendix B. For the purpose of comparison a 30 year period was used. This period includes the 3 year construction period, the 25 loan period and an additional two years to get a sense of the cost of operation after the loans have been paid.

There were three separate cost sheets prepared for the KWA option. The first cost sheet (KWA) is based on the cost estimate provided by KWA. The costs provided assumed no overruns or delay in construction. With KWA's own assumptions of an overrun in construction of 15% and a one year delay in operations, the KWA estimated cost becomes $686,375,920 through Year 2042.

Since this cost estimate did not appear to include the financing of revenue bonds, another cost sheet (KWA-1) was developed that included KWA's cost estimate without overruns with the additional finance costs associated with the revenue bonds. A final cost sheet (KWA-2) includes the cost associated with the revenue bonds based on the estimate provided by TYJT for the Treasury.

A summary of the cost sheets provided in Appendix B are shown in Table 6-1. Figure 6-1 shows the cumulative annual costs associated with each option.

8 MGD MAX day will force Flint to use >10 MGD Put KWA WQ issues soften Sludge disp. Buried - enc

	Total Cost through 2042	Option #
DWSD 8 MGD Maximum Day at Imlay Station	634,795,488	1
KWA *(10/31/12 No Overruns, As Provided)**	649,775,166	2
DWSD 8 MGD Maximum Day at FL-1	672,671,705	3
KWA-1 *(10/31/12 No Overruns with Cost of Financing)*	707,279,715	4
DWSD 12 MGD Maximum Day at Imlay Station	725,576,803	5
DWSD 12 MGD Maximum Day at FL-1	762,110,308	6
KWA-2 *(Treasury Estimate)*	766,784,313	7
DWSD 18 MGD Maximum Day at FL-1	821,226,268	8

$ 172 M ll

* $686,375,920 with 15% overrun in construction and a one year delay in operations

Table 6-1: Total Cost of Options through 2042

Based on the analysis, it is prudent to assume the KWA water supply option costs would be somewhere between the KWA-1 and KWA-2 options. Therefore, the analysis indicates that the two DWSD options of supplying 8 MGD on a maximum day and up to 8 MGD on average are the least cost options for Flint. These options allow Flint to maximize the use of existing assets; the City of Flint's (the Flint WTP) and DWSD's (the existing 72-inch main).

Additionally, in recent conversations with the Treasury another option was discussed that could potentially be the most cost-effective solution. Currently the Flint WTP serves as a backup if service is

lost through either the DWSD or KWA pipeline. If the a twin pipe paralleling the DWSD 72-inch water main were constructed with interconnects with the 72-inch line, then the new water main could serve as the backup to Flint and the Flint WTP could be abandoned or potentially sold to Genesee County for their use.

The construction of the parallel pipeline would be considered in the DWSD capital expenditure as a Common to All (CTA) cost. This means that the capital cost of the pipeline would be shared by all DWSD customers and not just by Flint. Preliminary analysis of this option appears to be the most cost-effective of all the options discussed. However, a more thorough cost analysis is warranted and this approach would require an agreement between Flint and DWSD.

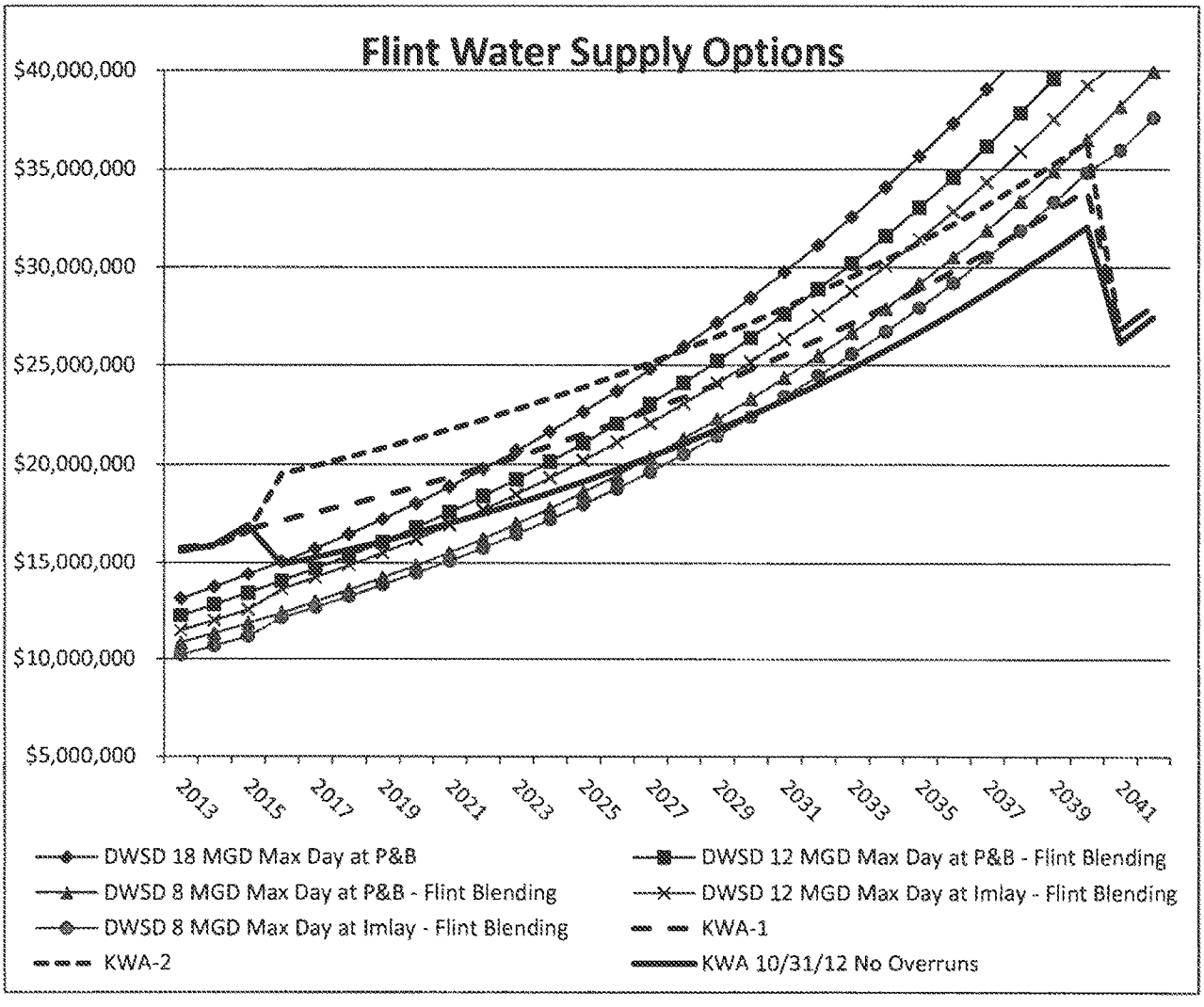


Figure 6-1: Flint Water Supply Options through 2042

7. OTHER CONSIDERATIONS

As part of the investigation other issues were identified that may result in risks to Flint that should be considered by the Treasury in determining how Flint's potable water should be supplied. These issues are related to redundancy and reliability, other items affecting cost, and Flint's desire to control its own destiny related to its water supply. These are described further below.

Redundancy/Reliability

In one of the first meetings related to this task assessment, which was held on November 1, 2012, the Genesee County Drain Commissioner, Mr. Jeff Wright, stated that one of the main reasons for pursuing the KWA supply option related to the lack of reliability of the DWSD system. He pointed to the Northeast blackout of 2003; a widespread power outage that occurred throughout parts of the Northeastern and Midwestern United States and Ontario, Canada, on Thursday, August 14, 2003. He stated that Flint and Genesee County were out of water for several days.

It is worth noting that this was a power outage of historic proportions that affected millions of Americans. However, DWSD did begin supplying water again relatively quickly in comparison to other major cities impacted by the same power outage.

Furthermore, the KWA supply system offers less redundancy to Flint than the current DWSD system. Under both options, Flint is supplied by a single pipeline; however, DWSD has backup power at all of its major facilities supplying Flint. The KWA system will not have a redundant power at its pumping facilities. This would be a major risk.

Currently, backup to the DWSD system for Flint is Flint's WTP using the Flint River as the source of supply. KWA has stated that the Flint River source would also be used as backup to Flint if the KWA supply through its pipeline was lost. However, since the Flint WTP would be upgraded to treat Lake Huron water under the KWA option, using the Flint River as a backup source would require the Flint WTP to maintain two process treatment streams.

In addition to Flint and Genesee County, the DWSD's 72-inch main supplies Imlay City, Mayfield and the Greater Lapeer County Utilities Authority (GLCUA). The volume of water contained within the 72-inch main is approximately 30 MG. Only supplying these three remaining communities would cause the water age to increase dramatically; somewhere in excess of three weeks old, before reaching the customers' master meters. Since the half-life of chlorine in the DWSD system is approximately 5 days, the chlorine would most probably be near zero requiring re-chlorination of the finished water upstream of the master meters.

Re-chlorinating is a costly and risky process due to the instability of chlorine gas. It is unknown whether DWSD would pursue this improvement or possibly abandoned the 72-inch pipeline.

If Flint is supplied by the KWA system, then DWSD supplying their other customers along the 72-inch water main may be reconsidered. Since the KWA system is a raw water supply, the communities would

either have to build a treatment facility to treat the water from KWA or find another water source for their communities.

Additional Cost and Risk Considerations

The design of the KWA supply and the construction of the system have not been completed; therefore, final costs and time to complete are unknown. Cost overruns and delays in completion will both negatively impact Flint's final cost. As example, if the project is not completed within the three year period, payment on the bonds will be due, but the revenue source needed from the sale of water could not be provided.

Furthermore, there is always a risk with large water system construction; especially those including an intake in the Great Lakes, pumping stations and rehabilitation of older water treatment plants. These risks include the potential of explosive gases in tunneling below Lake Huron, changing site conditions associated with the large number of miles of pipe installation and rehabilitating an older WTP, and the startup and debugging of the entire pumping system.

Flint has indicated that they have a high water loss. Not addressing this issue prior to sizing the Flint supply pipeline from KWA could cause the water main to be oversized along with its incremental cost in construction.

Also, the KWA supply option appears to run counter to the Treasury's Competitive Grant Assistance Program (Formerly EVIP Grant). This program has been put in place to allow for communities to consolidate their services and save money. Two existing customers of DWSD (Flint and Genesee County) along with the potential of others customers (GLCUA, Mayfield, Imlay City) separating to from another water system is in contradiction to the program.

Finally, there is a concern over the ability of smaller systems (KWA) over larger systems (DWSD) to pay for future unfunded mandates and regulations. Obviously, identifying regulation requirements over 30 years is hard to determine. However, it is widely accepted that a large system has greater ability to respond to unfunded mandates because the cost can be distributed over a large customer base.

Flint's Autonomy

Flint has indicated that a major point of consideration is that they have no control over the rate increases issued to Flint by DWSD. All other counties supplied by DWSD have representatives on the Board of Water Commissioners (BOWC). The BOWC is one of the governing bodies that approve the water rates. Since Flint and Genesee County do not have a representative on the BOWC, Flint believes they are held "hostage" to DWSD's rates and cost of service.

This issue was stated in Flint's handout at the November 1, 2012 meeting. The handout is titled, "Flint Water Supply Future." However, it is worth noting in the same handout, Flint also identifies similar concerns with the governing board of the KWA system. Notably, that although Flint and Genesee County will be the only customers and Flint will be responsible for 30 percent of the construction cost,

they will have a minority vote on the KWA board. Furthermore, there are other communities (Lapeer County, the City of Lapeer, and Sanilac County) that sit on the board and vote. However, they are not purchasing water nor contributing to the construction costs.

may need to change

STATE OF MICHIGAN CONTRACT NO. 271N3200089

CITY OF FLINT WATER SUPPLY ASSESSMENT

State of Michigan, Department of Treasury

Appendix A: Meeting Minutes

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CONSULTING ENGINEERS-PLANNERS
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Detroit, Michigan 48226
(313)963-0612 FAX (313)963-2156

MEETING MINUTES

IN ATTENDANCE:	Sue McCormick, DWSD Director Darryl Latimer, DWSD Deputy Director George Karmo, TYJT Awni Qaqish, TYJT Dave Guastella, TYJT
DATE:	November 24, 2012
PURPOSE OF MEETING:	Meeting with DWSD for the Indefinite-scope, Indefinite-delivery Contract Number 00383, 2012 Professional General Architectural/Engineering Services – City of Flint Water Supply Assessment
PREPARED BY:	Dave Guastella

A meeting was held at the DWSD Main Office Building on November 19, 2012 to discuss the water supply options being presented by DWSD to the City of Flint. The main items discussed generally followed the attached DWSD Discussion/Questions that were provided to the Department prior to the meeting. A summary of the key points discussed are provided below.

DISCUSSION ITEMS

1. Question/Discussion Item: Verify that the four options presented at the November 1, 2012 meeting are still available for consideration:

    a. Supplied from Potter & Baxter using the new model contract (assume a Maximum Day Customer),

    b. Supplied from Imlay Station,

    c. Finished un-pumped supply from Lake Huron WTP, and

    d. Raw un-pumped supply from Lake Huron WTP.

    DWSD prefers to focus on the first two supply point listed; from the current location at Potter & Baxter and at the Imlay Pump Station as these apply specifically to Flint.

    DWSD provided the attached summary regarding the current costs to Flint based on the various options that DWSD is offering. The savings associated with each option is provided as well. As example, if Flint were to purchase water from the supply point located at Imlay Station, the current cost to Flint would be $5,661,000 and it would be a savings of nearly 50%

Comments: Meeting minutes were recorded based on the understanding of the author. Please contact the author within three days if you have any different understanding of the meeting. These minutes will be considered approved unless comments are provided within three days.

compared to Flint's current rate.

2. Question/Discussion Item: What additional capital improvements will be required for each option?

   If Imlay Pump Station is selected as the supply point then Flint would need to purchase the 72-inch water main and an agreement to supply Lapeer would need to be worked out. DWSD believes that this could be worked out through a "wheeling" charge over the 72-inch main or possibly moving the supply point downstream of the Lapeer connection.. DWSD estimates the value of the water main at $4.7M. Flint could bond for this amount or DWSD could include the cost into Flint's rate.

3. Question/Discussion Item: Are there other options being presented that should be considered (e.g., blending)?

   Only the two options indicated above are currently being considered and both would include blending; DWSD providing 2/3 of the supply and the Flint WTP providing the other 1/3.

4. Question/Discussion Item: To evaluate each option over the 25 year planning period, provide:

   a. Annual water rate for Flint for 2002 through 2012, and the

   b. Projected annual rate adjustment for each option. What are the proposed measures to keep the rate adjustments down in the future?

   DWSD provided the attached historical rates from 2002 through 2012 for the existing water contract with Flint. The attachment also includes what the rates would have been if Flint had signed the new model contract or had taken service from Imlay. These rates were provided back to 2010.

   DWSD believes that 5% would be a good estimation to assume for their annual escalation in rates over the 25 year planning period.

5. Question/Discussion Item: Flint stated a 10% increase in the capacity charge. What number did DWSD provide Flint?

   It was unclear to DWSD where the 10% increase in capacity charge stated by Flint came from. DWSD's information provided shows an average of 6.3%. DWSD offered a meeting with TYJT to discuss how the fixed and commodity charges are allocated.

6. Question/Discussion Item: Flint financial comparison is based on the initial Cost of $14,413,858, which includes $2,725,538 for Flint WTP operating cost; i.e, DWSD charge is $11,688,320. How good is this number?

   DWSD indicated that the charge of $11,638,320 is good through 6/30/13.based on their existing contract with DWSD.

7. Question/Discussion Item: KWA's initial charge to Flint is based on 12 MGD. Is DWSD charge

based on 12 MGD?

Yes, 12 MGD from DWSD would be a maximum with Flint supplying 6 MGD for a total of 18 MGD (2/3 vs. 1/3).

Comments: Meeting minutes were recorded based on the understanding of the author. Please contact the author within three days if you have any different understanding of the meeting. These minutes will be considered approved unless comments are provided within three days.

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Indefinite-scope, Indefinite-delivery Contract Number 00383
2012 Professional General Architectural/Engineering Services

CITY OF FLINT WATER SUPPLY ASSESSMENT

DWSD Discussion/Questions for the November 19, 2012 Meeting

1. Verify that the four options presented at the November 1, 2012 meeting are still available for consideration:
    c. Supplied from Potter & Baxter using the new model contract (assume a Maximum Day Customer),
    d. Supplied from Imlay Station,
    e. Finished un-pumped supply from Lake Huron WTP, and
    f. Raw un-pumped supply from Lake Huron WTP.
2. What additional capital improvements will be required for each option?
3. Are there other options being presented that should be considered (e.g., blending)?
4. To evaluate each option over the 25 year planning period, provide:
    g. Annual water rate for Flint for 2002 through 2012, and the
    h. Projected annual rate adjustment for each option. What are the proposed measures to keep the rate adjustments down in the future?
5. Flint stated a 10% increase in the capacity charge. What number did DWSD provide Flint?
6. Flint financial comparison is based on the initial Cost of $14,413,858, which includes $2,725,538 for Flint WTP operating cost, i.e DWSD charge is $11,688,320. How good is this number?
7. KWA's initial charge to Flint is based on 12 MGD. Is DWSD charge based on 12 MGD?

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Summary of DWSD Cost Allocations to Flint Under Various Scenarios

Flint Only

	Revenue Requirement	Rates and Charges: Fixed	Rates and Charges: Commodity	Rates and Charges: Avg Unit Cost
1 **Status Quo**	11,461,700	357,271	12.46	19.91
2 **Model Contract**	9,732,100	275,517	11.16	16.90
3 Change	(1,729,600)	(81,754)	(1.30)	(3.00)
4 % Change	*-15.1%*	*-22.9%*	*-10.4%*	*-15.1%*
5 **Max Day Only**	9,424,700	271,010	10.72	16.37
6 Change	(307,400)	(4,507)	(0.44)	(0.53)
7 % Change	*-3.3%*	*-1.7%*	*-4.1%*	*-3.3%*
8 **Allow Blending**	6,302,800	182,369	10.72	16.42
9 Change	(3,121,900)	(88,641)	0.00	0.05
10 % Change	*-49.5%*	*-48.6%*	*0.0%*	*0.3%*
11 **Imlay City Connections**	5,800,700	170,912	9.77	15.11
12 Change	(502,100)	(11,457)	(0.95)	(1.31)
13 % Change	*-8.7%*	*-6.7%*	*-9.7%*	*-8.7%*
14 Cumulative Change	(5,661,000)	(186,359)	(2.69)	(4.80)
15 Cumulative %Change	*-49.4%*	*-52.2%*	*-21.6%*	*-24.1%*

	Assumptions: Avg Day	Max Day	Peak Hour	Distance	Elevation	Sales
	mgd	*mgd*	*mgd*	*miles*	*feet*	*mgd*
1 **Status Quo**	11.8	21.6	22.6	52.0	866	**11.8**
2 **Model Contract**	11.8	**17.9**	**18.8**	52.0	866	11.8
3 **Max Day Only**	11.8	17.9	**17.9**	52.0	866	11.8
4 **Allow Blending**	7.9	**11.9**	**11.9**	52.0	866	7.9
5 **Imlay City Connections**	7.9	11.9	11.9	**45.2**	**866**	7.9

Recent DWSD Water Rates to Flint

	Rates and Charges			Annual Change			*Average*
FY	Fixed	Commodity	Avg Unit Cost	Fixed	Commodity	Avg Unit Cost	*Annual Change*
	$/mo	*$/Mcf*	*$/Mcf*	*$/mo*	*$/Mcf*	*$/Mcf*	
As Charged							
2004		11.06	11.06				
2005		10.24	10.24			-7.4%	
2006		10.56	10.56			3.1%	
2007		11.09	11.09			5.0%	
2008		11.35	11.35			2.3%	
2009		13.07	13.07			15.2%	
2010		14.32	14.32			9.6%	
2011	182,301	14.29	16.01		-0.2%	11.8%	
2012	443,096	13.36	17.53	143.1%	-6.5%	9.5%	
2013	707,000	12.46	19.12	59.6%	-6.7%	9.1%	**6.3%**
Hypothetical Model Contract							
2004		11.06	11.06				
2005		10.24	10.24			-7.4%	
2006		10.56	10.56			3.1%	
2007		11.09	11.09			5.0%	
2008		11.35	11.35			2.3%	
2009		13.07	13.07			15.2%	
2010		***13.96***	***13.96***			6.8%	
2011	***145,918***	***13.74***	***15.28***		-1.6%	9.5%	
2012	***378,968***	***12.58***	***16.57***	159.7%	-8.4%	8.4%	
2013	***597,323***	***11.63***	***17.93***	57.6%	-7.6%	8.2%	**5.5%**

Recent DWSD Water Rates to Flint

	Rates and Charges			Annual Change			*Average*
FY	Fixed	Commodity	Avg Unit Cost	Fixed	Commodity	Avg Unit Cost	*Annual Change*
	$/mo	*$/Mcf*	*$/Mcf*	*$/mo*	*$/Mcf*	*$/Mcf*	
As Charged							
2004		11.06	11.06				
2005		10.24	10.24			-7.4%	
2006		10.56	10.56			3.1%	
2007		11.09	11.09			5.0%	
2008		11.35	11.35			2.3%	
2009		13.07	13.07			15.2%	
2010		14.32	14.32			9.6%	
2011	182,301	14.29	16.01		-0.2%	11.8%	
2012	443,096	13.36	17.53	143.1%	-6.5%	9.5%	
2013	707,000	12.46	19.12	59.6%	-6.7%	9.1%	6.3%
*Hypothetical Model Contract - **Flint Only***							
2004		11.06	11.06				
2005		10.24	10.24			-7.4%	
2006		10.56	10.56			3.1%	
2007		11.09	11.09			5.0%	
2008		11.35	11.35			2.3%	
2009		13.07	13.07			15.2%	
2010		*11.73*	*11.73*			-10.3%	
2011	*70,060*	*12.45*	*13.89*		6.1%	18.4%	
2012	*175,882*	*11.47*	*15.08*	151.0%	-7.9%	8.6%	
2013	*272,923*	*10.65*	*16.24*	55.2%	-7.1%	7.7%	4.4%

Recent DWSD Water Rates to Flint

FY	Rates and Charges			Annual Change			Average
	Fixed	Commodity	Avg Unit Cost	Fixed	Commodity	Avg Unit Cost	*Annual Change*
	$/mo	*$/Mcf*	*$/Mcf*	*$/mo*	*$/Mcf*	*$/Mcf*	
As Charged							
2004		11.06	11.06				
2005		10.24	10.24			-7.4%	
2006		10.56	10.56			3.1%	
2007		11.09	11.09			5.0%	
2008		11.35	11.35			2.3%	
2009		13.07	13.07			15.2%	
2010		14.32	14.32			9.6%	
2011	182,301	14.29	16.01		-0.2%	11.8%	
2012	443,096	13.36	17.53	143.1%	-6.5%	9.5%	
2013	707,000	12.46	19.12	59.6%	-6.7%	9.1%	**6.3%**
*Hypothetical Model Contract - **Flint Only** @ **Imlay***							
2004		11.06	11.06				
2005		10.24	10.24			-7.4%	
2006		10.56	10.56			3.1%	
2007		11.09	11.09			5.0%	
2008		11.35	11.35			2.3%	
2009		13.07	13.07			15.2%	
2010		***11.16***	***11.16***			-14.6%	
2011	***65,919***	***10.88***	***12.23***		-2.5%	9.6%	
2012	***165,275***	***9.89***	***13.28***	150.7%	-9.1%	8.6%	
2013	***255,580***	***9.09***	***14.32***	54.6%	-8.1%	7.8%	**2.9%**

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MEETING MINUTES

IN ATTENDANCE: Ed Kurtz; Flint Emergency Financial Manager, City of Flint
Dayne Walling; Mayor, City of Flint
Mike Brown, City of Flint
John O'Brien, Genesee County
Howard Croft, City of Flint
Dwayne "Duffy" Johnson, City of Flint
Brent Wright, City of Flint
Awni Qaqish, TYJT
Dave Guastella, TYJT

DATE: November 24, 2012

PURPOSE OF MEETING: Meeting with the City of Flint for the Indefinite-scope, Indefinite-delivery Contract Number 00383, 2012 Professional General Architectural/Engineering Services – City of Flint Water Supply Assessment

PREPARED BY: Dave Guastella

A meeting was held at the City of Flint Municipal Center on November 20, 2012 to discuss the water supply option being presented by the Karegnondi Water Authority (KWA) to the City of Flint. The main items discussed generally followed the attached KWA Discussion/Questions that were provided to City prior to the meeting. A summary of the key points discussed are provided below.

The questions submitted are repeated in the Discussion Items for easy reference. A summary of the action items generated from the meeting follow the Discussion Items.

DISCUSSION ITEMS

1. Question/Discussion Item: Is the maximum day demand of 18 MGD for Flint the maximum day demand (MDD) throughout the 25 year planning period? If not, what is the 25 year projected MDD?

   KWA would supply up to 18 MGD. 18 MGD has been assumed as the maximum day demand and 12 MGD is assumed as the average day demand throughout the 25 year planning period.

2. Question/Discussion Item: Copy of the intake contract documents and engineer's estimate.

   The intake contract documents are approximately 90% complete and are not available for distribution. However, the updated Appendix 20, dated October 4, 2012 includes the most recent cost estimate of the intake based on the current design in process.

Comments: Meeting minutes were recorded based on the understanding of the author. Please contact the author within three days if you have any different understanding of the meeting. These minutes will be considered approved unless comments are provided within three days.

3. Question/Discussion Item: Documentation of the Flint WTP improvements required and cost estimate.

   The costs are approximately $7M as presented in the September 2009 Preliminary Engineering Report. However, this estimate has been updated. Some processes have been eliminated. John O'Brien will provide the updated costs and the description of the planned improvements to the plant.

4. Question/Discussion Item: Confirm Flint's allocated percentage of the KWA capital improvements (30%?).

   Yes, the allocation is based on 18 MGD/60 MGD total capacity.

5. Question/Discussion Item: Copy of the proposed KWA operating agreement for Flint.

   John O'Brien will provide the operating agreement as well as the Capacity Contract and Articles of Incorporation.

6. Question/Discussion Item: What is the annual operating agreement adjustment projected for the 25 year planning period?

   This information is provided in Appendix 14, Table 14.2 of the September 2009 Preliminary Engineering Report. Operating cost based on Table 1. Used 12 MGD as average day demand (ADD). Assumed 5% as the annual increase in operating costs. John O'Brien indicated that these operating costs were based on Genesee County's operating costs. John O'Brien will provide the last 10 years of audited financial statements for the water fund.

   To assess operating and maintenance costs for the Flint WTP, Duffy will provide multiple years of financial statements for the water fund. Duffy did not believe they had 10 years, but they will provide what they have.

   Regarding operation and maintenance costs, Flint believes that these costs will increase by 2/3 of what they are now.

7. Question/Discussion Item: Need the route of the pipelines and the locations of the facilities proposed. Purpose is to identify constraints that impact costs (i.e., utilities, environmental (e.g. wetlands), easements, etc.).

   KWA will not release the route due to concerns regarding speculation of land and easements. John O'Brien did indicate that the Lake Huron pump station would be at Fisher and M-25. The intermediate pump station site is near a location of the Lapeer/Sanilac/St. Clair border; where all three meet.

8. Question/Discussion Item: KWA's initial charge to Flint is based on a 12 MGD average day demand. What is the basis of this number? Are there population projections and water use figures available that were used to determine the Flint demand for the 25 year planning period?

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This was answered in Question No. 1 above.

9. Question/Discussion Item: Is there a transition plan and cost during construction of the KWA system identified?

   Flint is looking for an agreement with DWSD for back-up supply from the 72-inch main at the Genesee border.

10. Question/Discussion Item: The October 4, 2012 Preliminary Engineering Report Update states: "no backup power is planned for the pumps" (LHPS) and "No backup power is planned for pumping" (IPS). In case of power loss, how would Flint supply its customers?

    Flint indicated that they have adequate storage to supply the system for 6 to 7 days. Flint has 55 MG of storage and Genesee County has 65 MG for 2.5 days.

11. Question/Discussion Item: The latest plan shows only a 5 million gallon ground reservoir is planned for balancing between LHPS and IPS. How is redundancy maintained?

    In cases of emergency, Flint indicated that the back-up for the KWA system will be the same as it is now with DWSD; they will use the Flint River as the source water. Flint currently operates their plant four times a year.

    When questioned as to whether the WTP will be able to treat both lake water from the KWA system and river water Flint indicated that once the improvements identified in the September 2009 Preliminary Engineering Report are completed they will be able to accomplish both treatment processes. Flint will provide a schematic of the treatment trains at the WTP and a copy of the Flint transmission system.

    Genesee County indicated that additional redundancy would also be provided from the new Genesee County WTP.

    Regarding hydraulic transients; Genesee County indicated that a model analysis has not been included, but capital costs for mitigating transients have been included.

12. Question/Discussion Item: Related to the construction cost:

    a. Does it include an additional traffic lane since the construction will occupy half the right of way? *Not required, all roads are county roads; however, there are a few State road crossings.*

    b. Does it include costs/fees for permit requirements such as inspection cost by the jurisdictional authorities? As a point of reference, the permit fee costs for the Flint Transmission System came out to be $5.8 million. *Not required; all of the counties have waived any fees.*

    c. Does the cost of the steel pipe segments include corrosion protection measures such as

anode stations and related O&M? *Yes; however, the KWA has not settled on using steel pipe. PCCP pipe may be used. Steel shown in estimate because it is highest in cost and therefore the pricing is conservative.*

d. SCADA monitoring stations require power. Is the cost of bring power to the SCADA stations included? Again, as a point of reference for the Flint Transmission System we estimated $800,000 for power to SCADA and valve operators. *Yes, Genesee County did emphasize that the SCADA system will be simple and straightforward because a lot of controls are not required.*

e. Other items discussed at the meeting included:

- The 2009 plant improvement cost is still good; however, there will be some reduction, such as a sulfuric chloride feed system that was eliminated. Plant capacity now is 36MGD, but will be 18 MGD.
- The KWA Lake Huron Pumping Station (LHPS) is now only high lift pump station.
- Genesee County will provide the distance of the intake pipe from the crib to the LHPS.
- The intake project is almost ready to bid; waiting for the COE permit.
- Genesee County is estimating the construction for the pipe lines and pump stations will begin July 2013.
- The route has been flown for survey.
- Genesee County is estimating construction will be complete and the project will be placed in service by Jan 2016.
- Genesee County to provide a list of assumptions that the $272 million cost estimate is based on since the route is now known.

13. The Flint River is identified as a backup: At what capacity? MDD or emergency supply?

The Flint River would serve as a back up supply.

14. Where did the 40 years come from (Flint hostage to Detroit)? DWSD's new contracts are 30 years with openers to revise terms of supply (volume and pressure) after the first two years, then three years, and then in five year increments thereafter.

The 40 years was stated in error. The reference was to DWSD's requirement to sign a 30 year contract.

After 40 years Flint will own 30% of the project and can sell their share of ownership if they want. Conversely, with DWSD, they continue to pay for the capital projects but have no ownership. Flint believes they will know what they will be charged for the next 25 years versus DWSD that can't commit to a fixed escalation.

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Action Items for Follow-up		
Items:	*Assigned To:*	*Date to Complete*
1. Updated Costs for the Flint WTP improvements and a description of the improvements.	John O'Brien	11/21/12
2. KWA Operating Agreement, Capacity Contract and Articles of Incorporation.	John O'Brien	11/20/12
3. Provide the last 10 years of audited financial statements for the Genesee water fund.	John O'Brien	11/20/12
4. Provide multiple years of financial statements for the City of Flint water fund.	Duffy Johnson	11/26/12
5. Provide schematic of the Flint WTP and a map of the Flint transmission system.	Brent Wright	11/26/12
6. Provide the length of the intake pipe from the crib to the pump station.	John O'Brien	11/20/12
7. Provide a list of assumptions that the $272 million cost estimate is based on since the route is now known.	John O'Brien	11/26/12

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Indefinite-scope, Indefinite-delivery Contract Number 00383
2012 Professional General Architectural/Engineering Services

CITY OF FLINT WATER SUPPLY ASSESSMENT

KWA Discussion/Questions for the November 20, 2012 Meeting

1. Is the maximum day demand of 18 MGD for Flint the maximum day demand (MDD) throughout the 25 year planning period? If not, what is the 25 year projected MDD?
2. Copy of the intake contract documents and engineer's estimate.
3. Documentation of the Flint WTP improvements required and cost estimate.
4. Confirm Flint's allocated percentage of the KWA capital improvements (30%?).
5. Copy of the proposed KWA operating agreement for Flint.
6. What is the annual operating agreement adjustment projected for the 25 year planning period?
7. Need the route of the pipelines and the locations of the facilities proposed. Purpose is to identify constraints that impact costs (i.e., utilities, environmental (e.g. wetlands), easements, etc.).
8. KWA's initial charge to Flint is based on a 12 MGD maximum day demand. What is the basis of this number? Are there population projections and water use figures available that were used to determine the Flint demand for the 25 year planning period?
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10. The October 4, 2012 Preliminary Engineering Report Update states: "no backup power is planned for the pumps" (LHPS) and "No backup power is planned for pumping" (IPS). In case of power loss, how would Flint supply its customers?
11. The latest plan shows only a 5 million gallon ground reservoir is planned for balancing between LHPS and IPS. How is redundancy maintained?
12. Related to the construction cost:
    a. Does it include an additional traffic lane since the construction will occupy half the right of way?
    b. Does it include costs/fees for permit requirements such as inspection cost by the jurisdictional authorities? As a point of reference, the permit fee costs for the Flint Transmission System came out to be $5.8 million.

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c. Does the cost of the steel pipe segments include corrosion protection measures such as anode stations and related O&M?
d. SCADA monitoring stations require power. Is the cost of bring power to the SCADA stations included? Again, as a point of reference the for the Flint Transmission System we estimated $800,000 for power to SCADA and valve operators.

13. The Flint River is identified as a backup: At what capacity? MDD or emergency supply?
14. Where did the 40 years come from (Flint hostage to Detroit)? DWSD's new contracts are 30 years with openers to revise terms of supply (volume and pressure) after the first two years, then three years, and then in five year increments thereafter.

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STATE OF MICHIGAN CONTRACT NO. 271N3200089

CITY OF FLINT WATER SUPPLY ASSESSMENT

State of Michigan, Department of Treasury

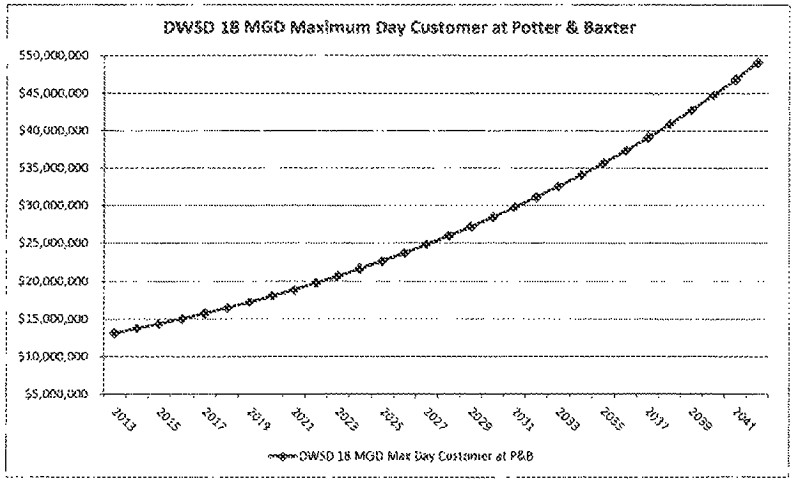
Appendix B: Cost Worksheets

DWSD Worksheet : 18 MGD Maximum Day Customer with Model Contract at Potter & Baxter

Capacity						Year	Flint WTP O&M	Water Purchase	Revenue Bond Payment	Interest on Reserve	TOTAL
Flint ADD:	0.60	MGD	81	MCF/Day	1	2013	$ 3,538,214	9,585,642		-	$ 13,123,856
DWSD ADD:	12	MGD	1,608	MCF/Day	2	2014	$ 3,697,788	10,036,167		-	$ 13,733,955
					3	2015	$ 3,864,558	10,507,867		-	$ 14,372,425
Annual Volume					4	2016	$ 4,038,850	11,001,736	-	-	$ 15,040,586
Flint:	29,412	MCF			5	2017	$ 4,221,002	11,518,818	-	-	$ 15,739,820
DWSD:	585,561	MCF			6	2018	$ 4,411,369	12,060,203	-	-	$ 16,471,571
					7	2019	$ 4,610,322	12,627,032	-	-	$ 17,237,354
2013 Cost of Supply					8	2020	$ 4,818,247	13,220,503	-	-	$ 18,038,750
Flint WTP O&M:	120.30	/MCF	$ 3,538,214	/Yr	9	2021	$ 5,035,550	13,841,866	-	-	$ 18,877,416
DWSD: $	16.37	/MCF	$ 9,585,642	/Yr	10	2022	$ 5,262,653	14,492,434	-	-	$ 19,755,087
					11	2023	$ 5,499,999	15,173,578	-	-	$ 20,673,577
					12	2024	$ 5,748,049	15,886,736	-	-	$ 21,634,785
Escalation/Inflation Rate					13	2025	$ 6,007,286	16,633,413	-	-	$ 22,640,699
Flint:	4.53%	/Yr			14	2026	$ 6,278,215	17,415,183	-	-	$ 23,693,398
DWSD:	4.7%	/Yr			15	2027	$ 6,561,362	18,233,697	-	-	$ 24,795,059
					16	2028	$ 6,857,279	19,090,681	-	-	$ 25,947,960
					17	2029	$ 7,166,543	19,987,943	-	-	$ 27,154,486
Capital Expenditure					18	2030	$ 7,489,754	20,927,376	-	-	$ 28,417,130
Amount: $	-				19	2031	$ 7,827,542	21,910,963	-	-	$ 29,738,505
Reserve: $	-	0%	Reserve Rate:	0.00%	20	2032	$ 8,180,564	22,940,778	-	-	$ 31,121,342
Amount plus Reserve: $	-				21	2033	$ 8,549,507	24,018,995	-	-	$ 32,568,502
Revenue Bond Rate:	5%				22	2034	$ 8,935,090	25,147,887	-	-	$ 34,082,977
Number of Years:	25				23	2035	$ 9,338,063	26,329,838	-	-	$ 35,667,901
Annual Cost:	$0				24	2036	$ 9,759,209	27,567,341	-	-	$ 37,326,550
					25	2037	$ 10,199,350	28,863,006	-	-	$ 39,062,355
						2038	$ 10,659,340	30,219,567	-	-	$ 40,878,907
						2039	$ 11,140,076	31,639,886	-	-	$ 42,779,963
						2040	$ 11,642,494	33,126,961	-	-	$ 44,769,455
						2041	$ 12,167,570	34,683,928	-	-	$ 46,851,499
						2042	$ 12,716,328	36,314,073	-	-	$ 49,030,401
							$ 218,222,171				

25 Yrs Cummulative	
$	596,916,046

30 Yrs Cummulative	
$	821,226,268



DWSD Worksheet : 12 MGD Maximum Day Customer with Model Contract at Potter & Baxter/Blending with Flint

Capacity

Flint ADD:	4	MGD	535	MCF/Day
DWSD ADD:	8	MGD	1,070	MCF/Day

Annual Volume

Flint:	195,187	MCF	195187.1658
DWSD:	390,374	MCF	
			5895097.471

2013 Cost of Supply

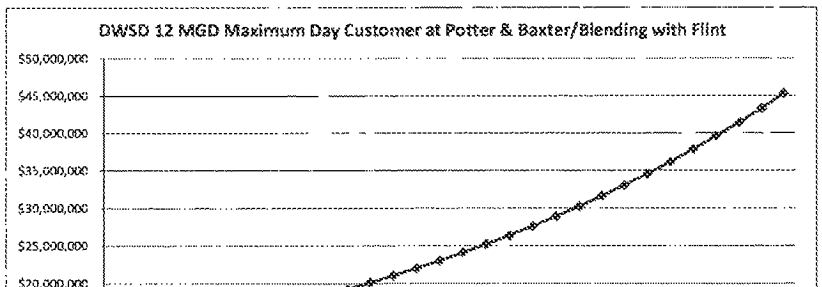
Flint WTP O&M:	$	30.20	/MCF	$ 5,895,097	/Yr
DWSD:	$	16.31	/MCF	$ 6,367,005	/Yr

Escalation/Inflation Rate

Flint:	4.51% /Yr
DWSD:	4.7% /Yr

Capital Expenditure

Amount:	$	-		
Reserve:	$	-	0%	Reserve Rate: 0.00%
Amount plus Reserve:	$	-		
Revenue Bond Rate:		5%		
Number of Years:		25		
Annual Cost:	$0			



	Year	Flint WTP O&M	Water Purchase	Revenue Bond Payment	Interest on Reserve	TOTAL
1	2013	$ 5,895,097	6,367,005		-	$ 12,262,103
2	2014	$ 6,160,968	6,666,255		-	$ 12,827,221
3	2015	$ 6,438,826	6,979,569		-	$ 13,418,395
4	2016	$ 6,729,217	7,307,608	-	-	$ 14,036,825
5	2017	$ 7,032,705	7,651,066	-	-	$ 14,683,771
6	2018	$ 7,349,880	8,010,666	-	-	$ 15,360,546
7	2019	$ 7,681,359	8,387,167	-	-	$ 16,068,527
8	2020	$ 8,027,789	8,781,364	-	-	$ 16,809,153
9	2021	$ 8,389,842	9,194,088	-	-	$ 17,583,930
10	2022	$ 8,768,224	9,626,210	-	-	$ 18,394,434
11	2023	$ 9,163,671	10,078,642	-	-	$ 19,242,313
12	2024	$ 9,576,952	10,552,338	-	-	$ 20,129,291
13	2025	$ 10,008,873	11,048,298	-	-	$ 21,057,171
14	2026	$ 10,460,273	11,567,568	-	-	$ 22,027,841
15	2027	$ 10,932,031	12,111,244	-	-	$ 23,043,275
16	2028	$ 11,425,066	12,680,473	-	-	$ 24,105,538
17	2029	$ 11,940,336	13,276,455	-	-	$ 25,216,791
18	2030	$ 12,478,845	13,900,448	-	-	$ 26,379,294
19	2031	$ 13,041,641	14,553,769	-	-	$ 27,595,410
20	2032	$ 13,629,819	15,237,796	-	-	$ 28,867,616
21	2033	$ 14,244,524	15,953,973	-	-	$ 30,198,497
22	2034	$ 14,886,952	16,703,810	-	-	$ 31,590,762
23	2035	$ 15,558,354	17,488,889	-	-	$ 33,047,242
24	2036	$ 16,260,035	18,310,866	-	-	$ 34,570,902
25	2037	$ 16,993,363	19,171,477	-	-	$ 36,164,840
	2038	$ 17,759,764	20,072,537	-	-	$ 37,832,300
	2039	$ 18,560,729	21,015,946	-	-	$ 39,576,675
	2040	$ 19,397,818	22,003,695	-	-	$ 41,401,513
	2041	$ 20,272,660	23,037,869			$ 43,310,528
	2042	$ 21,186,956	24,120,649			$ 45,307,605

25 Yrs Cummulative
$ 554,681,585

30 Yrs Cummulative
$ 762,110,308

DWSD Worksheet : 8 MGD Maximum Day Customer with Model Contract at Potter & Baxter/Blending with Flint

Capacity

Flint ADD:	4	MGD	535	MCF/Day
DWSD ADD:	8	MGD	1,070	MCF/Day

Annual Volume

Flint:	195,187	MCF
DWSD:	390,374	MCF

2013 Cost of Supply

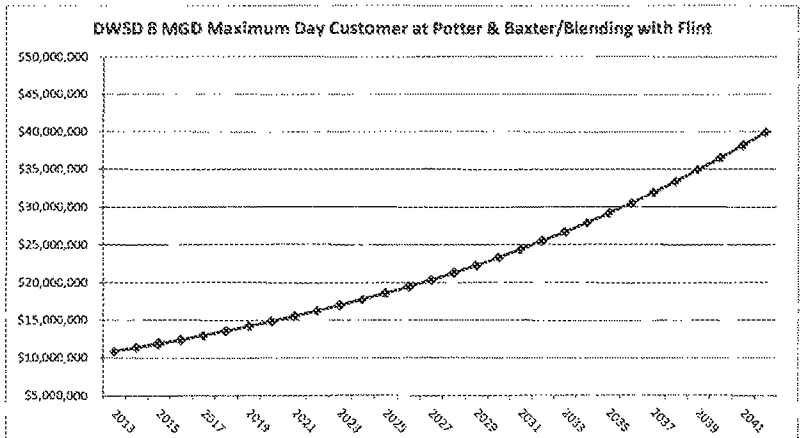
Flint WTP O&M:	$ 30.20	/MCF	$ 5,895,097	/Yr	
DWSD:	$ 12.68	/MCF	$ 4,949,947	/Yr	

Escalation/Inflation Rate

Flint:	4.51% /Yr
DWSD:	4.7% /Yr

Capital Expenditure

Amount:	$ -			
Reserve:	$ -	0%	Reserve Rate:	0.00%
Amount plus Reserve:	$ -			
Revenue Bond Rate:	5%			
Number of Years:	25			
Annual Cost:	$0			



	Year	Flint WTP O&M	Water Purchase	Revenue Bond Payment	Interest on Reserve	TOTAL
1	2013	$ 5,895,097	4,949,947		-	$ 10,845,044
2	2014	$ 6,160,966	5,182,594		-	$ 11,343,560
3	2015	$ 6,438,826	5,426,176		-	$ 11,865,002
4	2016	$ 6,729,217	5,681,206	-	-	$ 12,410,423
5	2017	$ 7,032,705	5,948,223	-	-	$ 12,980,928
6	2018	$ 7,349,880	6,227,789	-	-	$ 13,577,669
7	2019	$ 7,681,359	6,520,495	-	-	$ 14,201,855
8	2020	$ 8,027,789	6,826,959	-	-	$ 14,854,747
9	2021	$ 8,389,842	7,147,826	-	-	$ 15,537,668
10	2022	$ 8,768,224	7,483,774	-	-	$ 16,251,997
11	2023	$ 9,163,671	7,835,511	-	-	$ 16,999,182
12	2024	$ 9,576,952	8,203,780	-	-	$ 17,780,732
13	2025	$ 10,008,873	8,589,358	-	-	$ 18,598,230
14	2026	$ 10,460,273	8,993,057	-	-	$ 19,453,330
15	2027	$ 10,932,031	9,415,731	-	-	$ 20,347,762
16	2028	$ 11,425,066	9,858,271	-	-	$ 21,283,336
17	2029	$ 11,940,336	10,321,609	-	-	$ 22,261,945
18	2030	$ 12,478,845	10,806,725	-	-	$ 23,285,570
19	2031	$ 13,041,641	11,314,641	-	-	$ 24,356,282
20	2032	$ 13,629,819	11,846,429	-	-	$ 25,476,248
21	2033	$ 14,244,524	12,403,211	-	-	$ 26,647,735
22	2034	$ 14,886,952	12,986,162	-	-	$ 27,873,114
23	2035	$ 15,558,354	13,596,512	-	-	$ 29,154,866
24	2036	$ 16,260,035	14,235,548	-	-	$ 30,495,583
25	2037	$ 16,993,363	14,904,619	-	-	$ 31,897,982
	2038	$ 17,759,764	15,605,136	-	-	$ 33,364,899
	2039	$ 18,560,729	16,338,577	-	-	$ 34,899,306
	2040	$ 19,397,838	17,106,490	-	-	$ 36,504,328
	2041	$ 20,272,660	17,910,495			$ 38,183,155
	2042	$ 21,186,956	18,752,288			$ 39,939,245

25 Yrs Cummulative
$ 489,780,792

30 Yrs Cummulative
$ 672,671,765

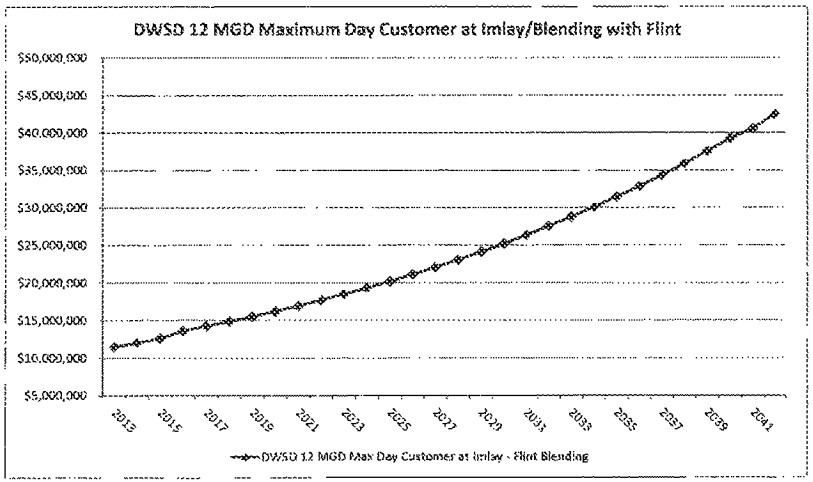
DWSD Worksheet : 12 MGD Maximum Day Customer with Model Contract at Imlay/Blending with Flint

Capacity												
Flint ADD:	4	MGD	535	MCF/Day	1							
DWSD ADD:	8	MGD	1,070	MCF/Day	2							
					3							
Annual Volume					4							
Flint:	195,187	MCF			5							
DWSD:	390,374	MCF			6							
					7							
2013 Cost of Supply					8							
Flint WTP O&M:	$ 30.20	/MCF	$ 5,895,097	/Yr	9							
DWSD:	$ 14.38	/MCF	$ 5,613,583	/Yr	10							
					11							
					12							
Escalation/Inflation Rate					13							
Flint:	4.51%	/Yr			14							
DWSD:	4.7%	/Yr			15							
					16							
Capital Expenditure					17							
Capital:	$ 4,700,000				18							
Bond Issuance (3% of Total):	155,000	Check:	3.0%		19							
3 Years of Capitalized Interest:	975,000	Check:	5.0%	/Yr (Bond Interest on Total)	20							
Reserve (10% of Total):	650,000	Check:	10.0%		21							
Total:	$ 6,520,000				22							
Revenue Bond Rate:	5%				23							
Number of Years:	25				24							
Annual Cost:	$462,610				25							
Interest on Reserve:	3%											

Year	Flint WTP O&M	Water Purchase	Revenue Bond Payment	Interest on Reserve	TOTAL
2013	$ 5,895,097	5,613,583		19,500	$ 11,489,180
2014	$ 6,160,966	5,877,421		19,500	$ 12,018,888
2015	$ 6,438,826	6,153,660		19,500	$ 12,572,986
2016	$ 6,729,217	6,442,882	462,610	19,500	$ 13,615,209
2017	$ 7,032,705	6,745,698	462,610	19,500	$ 14,221,512
2018	$ 7,349,880	7,062,745	462,610	19,500	$ 14,855,735
2019	$ 7,681,359	7,394,694	462,610	19,500	$ 15,519,164
2020	$ 8,027,789	7,742,245	462,610	19,500	$ 16,213,144
2021	$ 8,389,842	8,106,131	462,610	19,500	$ 16,939,082
2022	$ 8,768,224	8,487,119	462,610	19,500	$ 17,698,452
2023	$ 9,163,671	8,886,013	462,610	19,500	$ 18,492,794
2024	$ 9,576,952	9,303,656	462,610	19,500	$ 19,323,718
2025	$ 10,008,873	9,740,928	462,610	19,500	$ 20,192,910
2026	$ 10,460,273	10,198,751	462,610	19,500	$ 21,102,134
2027	$ 10,932,031	10,678,093	462,610	19,500	$ 22,053,234
2028	$ 11,425,066	11,179,963	462,610	19,500	$ 23,048,139
2029	$ 11,940,336	11,705,421	462,610	19,500	$ 24,088,867
2030	$ 12,478,845	12,255,576	462,610	19,500	$ 25,177,531
2031	$ 13,041,641	12,831,588	462,610	19,500	$ 26,316,339
2032	$ 13,629,819	13,434,673	462,610	19,500	$ 27,507,602
2033	$ 14,244,524	14,066,102	462,610	19,500	$ 28,753,736
2034	$ 14,886,952	14,727,209	462,610	19,500	$ 30,057,271
2035	$ 15,558,354	15,419,388	462,610	19,500	$ 31,420,852
2036	$ 16,260,035	16,144,099	462,610	19,500	$ 32,847,245
2037	$ 16,993,363	16,902,872	462,610	19,500	$ 34,339,345
2038	$ 17,759,764	17,697,307	462,610	19,500	$ 35,909,181
2039	$ 18,560,729	18,529,080	462,610	19,500	$ 37,532,919
2040	$ 19,397,818	19,399,947	462,610	19,500	$ 39,240,875
2041	$ 20,272,660	20,311,745			$ 40,584,404
2042	$ 21,186,956	21,266,397			$ 42,453,353

25 Yrs Cummulative
$ 529,865,071

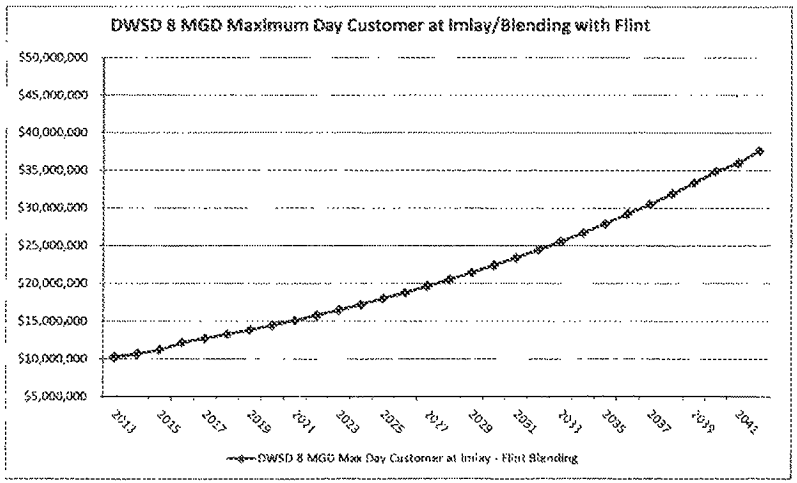
30 Yrs Cummulative
$ 725,576,803



DWSD Worksheet : 8 MGD Maximum Day Customer with Model Contract at Imlay/Blending with Flint

Capacity				
Flint ADD:	4	MGD	535	MCF/Day
DWSD ADD:	8	MGD	1,070	MCF/Day
Annual Volume				
Flint:	195,187	MCF		
DWSD:	390,374	MCF		
2013 Cost of Supply				
Flint WTP O&M:	$ 30.20	/MCF	$ 5,895,097	/Yr
DWSD:	$ 11.11	/MCF	$ 4,337,059	/Yr
Escalation/Inflation Rate				
Flint:	4.51%	/Yr		
DWSD:	4.7%	/Yr		
Capital Expenditure				
Capital:	$ 4,700,000			
Bond Issuance (3% of Total):	195,000	Check:	3.0%	
3 Years of Capitalized Interest:	975,000	Check:	5.0%	/Yr (Bond Interest on Total)
Reserve (10% of Total):	650,000	Check:	10.0%	
Total:	$ 6,520,000			

Revenue Bond Rate:	5%
Number of Years:	25
Annual Cost:	$462,610
Interest on Reserve:	3%



	Year	Flint WTP O&M	Water Purchase	Revenue Bond Payment	Interest on Reserve	TOTAL
1	2013	$ 5,895,097	4,337,059		19,500	$ 10,212,656
2	2014	$ 6,160,966	4,540,901		19,500	$ 10,682,367
3	2015	$ 6,438,826	4,754,323		19,500	$ 11,173,649
4	2016	$ 6,729,217	4,977,776	462,610	19,500	$ 12,150,103
5	2017	$ 7,032,705	5,211,732	462,610	19,500	$ 12,687,546
6	2018	$ 7,349,880	5,456,683	462,610	19,500	$ 13,249,673
7	2019	$ 7,681,359	5,713,147	462,610	19,500	$ 13,837,616
8	2020	$ 8,027,789	5,981,665	462,610	19,500	$ 14,452,564
9	2021	$ 8,389,842	6,262,803	462,610	19,500	$ 15,085,755
10	2022	$ 8,768,224	6,557,155	462,610	19,500	$ 15,768,489
11	2023	$ 9,163,673	6,865,341	462,610	19,500	$ 16,472,122
12	2024	$ 9,576,952	7,188,012	462,610	19,500	$ 17,208,074
13	2025	$ 10,008,873	7,525,849	462,610	19,500	$ 17,977,832
14	2026	$ 10,460,273	7,879,564	462,610	19,500	$ 18,782,947
15	2027	$ 10,932,031	8,249,903	462,610	19,500	$ 19,625,044
16	2028	$ 11,425,066	8,637,649	462,610	19,500	$ 20,505,824
17	2029	$ 11,940,336	9,043,618	462,610	19,500	$ 21,427,064
18	2030	$ 12,478,845	9,468,668	462,610	19,500	$ 22,350,624
19	2031	$ 13,041,641	9,913,696	462,610	19,500	$ 23,358,447
20	2032	$ 13,629,819	10,379,639	462,610	19,500	$ 24,452,569
21	2033	$ 14,244,524	10,867,482	462,610	19,500	$ 25,556,117
22	2034	$ 14,886,952	11,378,254	462,610	19,500	$ 26,708,316
23	2035	$ 15,558,354	11,913,032	462,610	19,500	$ 27,934,496
24	2036	$ 16,260,035	12,472,945	462,610	19,500	$ 29,176,090
25	2037	$ 16,993,363	13,059,173	462,610	19,500	$ 30,495,686
	2038	$ 17,759,764	13,672,954	462,610	19,500	$ 31,875,828
	2039	$ 18,560,729	14,315,583	462,610	19,500	$ 33,319,422
	2040	$ 19,397,818	14,988,415	462,610	19,500	$ 34,829,343
	2041	$ 20,272,660	15,692,871			$ 35,965,530
	2042	$ 21,186,956	16,430,436			$ 37,617,392

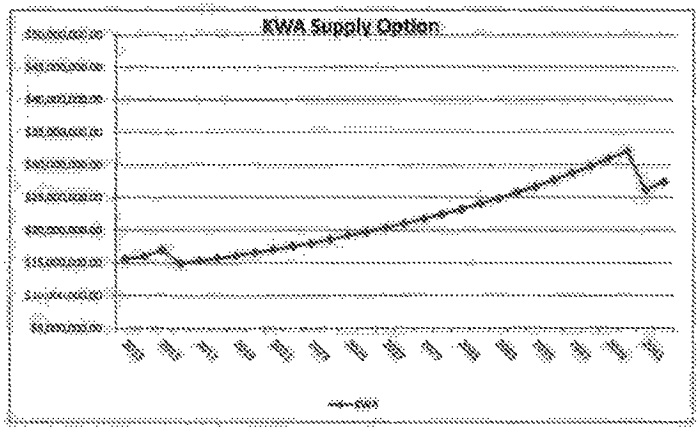
25 Yrs Cummulative	
$	493,063,801

30 Yrs Cummulative	
$	634,795,488

KWA Supply Option Worksheet
Date 10/31/12 No Overruns

	Year	SWP/D & Flint WTP Costs	Kwck Entry Fee	KWA Debt service	Flint WTP Debt Service	KWA Operation s	Flint WTP Operations with KWA	TOTAL
1	2013	$ 14,413,878	3,182,800					$ 15,576,058
2	2014	$ 15,355,330	581,400					$ 15,936,535
3	2015	$ 15,355,534	581,400					$ 15,936,934
4	2016			6,593,155	572,781	676,888	6,843,504	$ 14,686,328
5	2017			6,593,155	572,781	922,812	7,185,511	$ 15,274,258
6	2018			6,593,155	572,781	968,953	7,341,787	$ 15,676,676
7	2019			6,593,155	572,781	1,017,401	7,502,035	$ 16,085,368
8	2020			6,593,155	572,781	1,068,271	8,318,127	$ 16,552,218
9	2021			6,593,155	572,781	1,121,685	8,734,034	$ 17,021,854
10	2022			6,593,155	572,781	1,177,769	9,170,736	$ 17,516,440
11	2023			6,593,155	572,781	1,236,657	9,628,273	$ 18,031,865
12	2024			6,593,155	572,781	1,298,490	10,110,736	$ 18,575,162
13	2025			6,593,155	572,781	1,363,414	10,616,273	$ 19,145,823
14	2026			6,593,155	572,781	1,431,585	11,147,088	$ 19,744,807
15	2027			6,593,155	572,781	1,503,164	11,704,443	$ 20,373,543
16	2028			6,593,155	572,781	1,578,322	12,289,665	$ 21,033,923
17	2029			6,593,155	572,781	1,657,238	12,904,148	$ 21,727,328
18	2030			6,593,155	572,781	1,740,100	13,549,357	$ 22,455,392
19	2031			6,593,155	572,781	1,827,105	14,226,825	$ 23,219,866
20	2032			6,593,155	572,781	1,918,461	14,938,166	$ 24,022,564
21	2033			6,593,155	572,781	2,014,384	15,685,075	$ 24,865,398
22	2034			6,593,155	572,781	2,115,103	16,469,329	$ 25,750,367
23	2035			6,593,155	572,781	2,220,858	17,292,795	$ 26,679,584
24	2036			6,593,155	572,781	2,331,901	18,157,435	$ 27,655,356
25	2037			6,593,155	572,781	2,448,496	19,065,307	$ 28,679,733
	2038			6,593,155	572,781	2,570,921	20,018,572	$ 29,755,852
	2039			6,593,155	572,781	2,699,467	21,019,499	$ 30,884,897
	2040			6,593,155	572,781	2,834,440	22,070,474	$ 32,070,849
	2041					3,976,162	23,173,998	$ 27,150,159
	2042					3,124,970	24,332,698	$ 27,457,668

20 Yrs Cumulative	20 Yrs Cumulative
$ 503,456,386	$ 649,775,186



KWA Supply Option Worksheet

KWA-3

Capacity

Plant 5000:	12.5000	1,000	MGD/Day
Plant 6000:	12.5000	1,000	MGD/Day

Annual Volume

Plant	365,001	MGD
KWA	365,001	MGD

2018 Cost of Supply

Plant 5000 O&M:	$ 19.21	/MGD	$ 7,008,330	/Yr
KWA:	$ 1.50	/MGD	$ 608,888	/Yr

Regulatory Inflation Rate

Plant:	5.00%	/Yr
KWA:	5.00%	/Yr

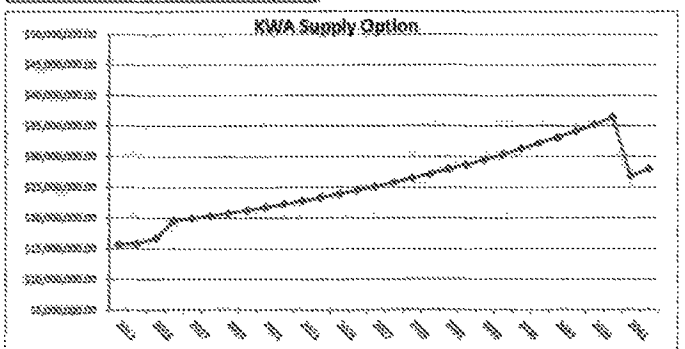
Capital Expenditure

Capital:	$ 357,370,000			
Bond Issuance (2.25% of Total):	12,650,000	Check:	2.25%	
3 Years of Capitalized Interest:	74,000,000	Check:	5.0%	/Yr (Bond Interest on Total)
Reserve (100% of Total):	65,000,000	Check:	18.0%	
Total:	$ 481,020,000			
Plant Share (60%):	$ 347,480,618			

Revenue Bond Rate:	5%
Number of Years:	20
Annual Cost:	$30,466,000
Interest on Reserve:	5%

Capital:	$ 7,000,000			
Bond Issuance (3% of Total):	300,000	Check:	2.25%	
3 Years of Capitalized Interest:	2,400,000	Check:	5.0%	/Yr (Bond Interest on Total)
Reserve (100% of Total):	2,000,000	Check:	18.0%	
Total:	$ 20,000,000			

Revenue Bond Rate:	5%
Number of Years:	20
Annual Cost:	$700,000
Interest on Reserve:	5%



22 Yr Commodities
$ 406,057,948

30 Yr Commodities
$ 788,766,519

	Year	Plant 5000 O&M	Water Purchase	KWA Revenue Pre-Bond Retiry Fee & Bond Payment	Plant Revenue Bond Payment	Interest on Reserve	TOTAL
1	2015	$ 8,599,704	12,661,780	3,181,800		473,100	$ 25,008,614
2	2016	$ 8,607,788	13,294,748	781,800		473,100	$ 23,848,875
3	2017	$ 8,696,266	13,959,486	781,800		473,100	$ 24,909,302
4	2018	$ 7,913,116	874,960	10,464,600	756,900	473,100	$ 30,540,860
5	2019	$ 8,270,090	952,613	10,464,600	756,900	473,100	$ 30,861,923
6	2020	$ 8,553,977	966,958	10,464,600	756,900	473,100	$ 30,580,944
7	2021	$ 8,653,775	1,017,005	10,464,600	756,900	473,100	$ 20,788,888
8	2022	$ 8,948,153	1,068,375	10,464,600	756,900	473,100	$ 21,258,888
9	2023	$ 9,255,304	1,121,668	10,464,600	756,900	473,100	$ 31,196,101
10	2024	$ 9,570,870	1,177,780	10,464,600	756,900	473,100	$ 32,557,537
11	2025	$ 10,775,676	1,236,657	10,464,600	756,900	473,100	$ 22,708,845
12	2026	$ 11,203,886	1,298,490	10,464,600	756,900	473,100	$ 23,908,870
13	2027	$ 11,799,778	1,362,414	10,464,600	756,900	473,100	$ 25,861,705
14	2028	$ 12,300,536	1,430,535	10,464,600	756,900	473,100	$ 26,680,885
15	2029	$ 12,888,552	1,502,164	10,464,600	756,900	473,100	$ 25,597,029
16	2030	$ 13,495,328	1,578,022	10,464,600	756,900	473,100	$ 28,765,850
17	2031	$ 14,045,053	1,657,229	10,464,600	756,900	473,100	$ 28,396,884
18	2032	$ 14,879,305	1,740,101	10,464,600	756,900	473,100	$ 27,102,927
19	2033	$ 15,630,156	1,827,106	10,464,600	756,900	473,100	$ 27,852,722
20	2034	$ 16,027,775	1,918,461	10,464,600	756,900	473,100	$ 28,658,736
21	2035	$ 16,788,657	2,014,884	10,464,600	756,900	473,100	$ 29,618,324
22	2036	$ 17,668,090	2,115,628	10,464,600	756,900	473,100	$ 30,938,886
23	2037	$ 18,598,605	2,220,858	10,464,600	756,900	473,100	$ 31,264,875
24	2038	$ 19,530,787	2,331,801	10,464,600	756,900	473,100	$ 33,201,150
25	2039	$ 20,557,092	2,448,688	10,464,600	756,900	473,100	$ 35,388,080
	2040	$ 21,680,518	2,570,923	10,464,600	756,900	473,100	$ 36,305,752
	2041	$ 22,905,243	2,699,697	10,464,600	756,900	473,100	$ 37,279,181
	2042	$ 23,810,505	2,834,646	10,464,600	756,900	473,100	$ 38,895,535
	2043	$ 24,970,130	2,976,162				$ 30,815,482
	2044	$ 26,284,673	3,124,970				$ 36,888,992

Prysby, Mike (DEQ)

From: Brent Wright <bwright@cityofflint.com>
Sent: Wednesday, June 13, 2012 3:14 PM
To: Prysby, Mike (DEQ)
Subject: Re: FW: Flint WTP test run

Mike,

Just got off the phone with Fin-Tek and it's a go, we will be running the week of the 25th. Hope to see ya on the 29th.

Thanks,
Brent

On Wed, Jun 13, 2012 at 2:32 PM, Prysby, Mike (DEQ) <PRYSBYM@michigan.gov> wrote:

Brent,

Let me know as soon as you can whether a WTP test run will proceed the week of June 25th....RMD management is looking at this as a favorable stop for the Director.

Michael Prysby, P.E.

Acting District Supervisor

RMD, MDEQ

517 335-6122

From: Hall, Ben (DEQ)
Sent: Wednesday, June 13, 2012 2:09 PM
To: Prysby, Mike (DEQ)
Subject: RE: Flint WTP test run

Your candidate would be a good choice if I do not get any other ideas by next Monday we will pass it on to the director and staff. If we approve it plan on meeting them at the plant and you may have to develop directions to get them from their first stop to the second.

Ben Hall

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

May 11, 2015

Mr. Howard Kroft, Director of Public Works
City Of Flint
1101 South Saginaw Street
Flint, Michigan 48502

WSSN: 02310

Dear Mr. Kroft:

SUBJECT: Flint Cross Connection Control Program

This letter confirms my site visit on April 29, 2015, with Mr. Glen Thomas, Utilities/Cross Connection Division Inspector for the city of Flint. Mr. Stephen Busch from our office was also present. The purpose of the visit, in part, was to discuss the city's Cross Connection Control Program (CCCP).

The city of Flint has made significant progress in recent years regarding the implementation of the city's approved CCCP. This effort has included identification of accounts, inspection and re-inspection of accounts at the approved frequencies, and ensuring the testing of backflow prevention assemblies in accordance with approved frequencies. However, the city's most recent report of annual CCCP activities for 2014 indicates a significant decrease in these activities below minimum requirements, and this deficiency must be address.

Our office fully recognizes the recent staffing loss of the city's previous plumbing inspector and the importance of these plumbing inspection services in providing public health protection, but these activities should not be borne at the cost of the city's CCCP and the protections it provides. Given the bacterial detections that occurred in the city's water distribution system in August and September 2014, along with customer complaints regarding aesthetic water quality, the need for protection through cross connection control are very evident.

We also realize that implementing a CCCP of for a community water system of this magnitude requires a significant commitment of time and personnel. We encourage the city to review CCCP staffing needs and authorize the workforce necessary to comply with the city's approved CCCP requirements.

Should you require further information, please contact me at the telephone number below; via e-mail at prysbym@michigan.gov; or Department of Environmental Quality, P.O. Box 30242, Lansing, Michigan 48909.

Sincerely,

Michael F. Prysby, P.E.
District Engineer
Office of Drinking Water and
Municipal Assistance
Lansing District Office
(517) 290-8817

mfp/jlr

cc: Mr. Glen Thomas
Mr. Stephen Busch, P.E.

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

May 20, 2014

Mr. Brent Wright, Water Plant Superintendent
City of Flint Water Plant
4500 North Dort Highway
Flint, Michigan 48505

WSSN: 02310

Dear: Mr. Wright

Subject: Water Treatment Plant (WTP) Fluoridation

This letter, per your request, is being written to confirm the Department of Environmental Quality's (DEQ) position concerning the suspension of the application of fluoride until June 2014. Fluoridation was instituted in Flint approximately 50 years ago in order to increase the level of dental health protection.

While the DEQ supports fluoridation as the primary means to provide optimal dental health protection, we concur with the temporary interruption in fluoridation. This will allow WTP operators to focus on meeting the regulated drinking water standards and to increase proficiency in full-time WTP operation. The public health benefit of fluoridation is gained with long-term use and is not immediately compromised by a short-term interruption in application.

The focus on WTP operation is essential in meeting the regulated drinking water standards; thus, the city may suspend fluoridation until June 1, 2014. Please contact our office if fluoridation cannot resume by this date.

If you have any questions, feel free to contact me at (517) 290-8817; prysbym@michigan.gov; or Department of Environmental Quality, Office of Drinking Water and Municipal Assistance, Lansing District Office, 525 West Allegan Street, 1st Floor South, P.O. Box 30242, Lansing, Michigan 48909-7742.

Sincerely,

Michael F. Prysby, P.E.
District Engineer
Field Operations Section
Office of Drinking Water and
Municipal Assistance

mfp/jlr

cc: Mr. Howard Kroft, Utilities Director, City of Flint

interconnections have no requirement to establish an available or contracted capacity, the DEQ encourages the corresponding utilities to establish mutual aid agreements where possible. Such agreements can be developed through the Michigan Water/Wastewater Agency Response Network (MiWARN). For more information, please visit miwarn.org. A MiWARN brochure is also enclosed for your information.

If you have any questions, feel free to contact me at (517) 290-8817; prysbym@michigan.gov; or Department of Environmental Quality, Office of Drinking Water and Municipal Assistance, Lansing District Office, 525 West Allegan Street, 1st Floor South, P.O. Box 30242, Lansing, Michigan 48909-7742.

Sincerely,

Michael F. Prysby, P.E.
District Engineer
Field Operations Section
Office of Drinking Water and
Municipal Assistance

mfp/jlr
Enclosure

cc: Mr. Howard Kroft, Utilities Director, City of Flint

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

April 29, 2014

Mr. Daugherty Johnson, Utilities Administrator
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502

WSSN: 02310

Dear: Mr. Johnson

Subject: Act 399 Capacity and Reliability Requirements

This letter, per your request, is being written as verification that the City of Flint water system is currently in compliance with required capacity and power service reliability requirements under the Michigan Safe Drinking Water Act and Administrative Rules, Supplying Water to the Public.

The required capacity of a waterworks system as established in Rule 1204 (R 325.11204) required sufficient capacity to meet approved finished water supply requirements, and is based upon the combination of the following options:

a. Rated capacity of an approved surface water supply or complete treatment system;
b. Firm capacity of approved groundwater supply;
c. Available contracted capacity that can be delivered from another public water supply;
d. Excess finished water storage capacity.

Under the first option listed above, the City's baseline water withdrawal capacity from the Flint River, and rated capacity of the City's water treatment plant (WTP), both exceed its finished water supply requirements. The rated capacity of a complete treatment system is established under Rule 1006 (R 325.11006). In accordance with this rule, the Department of Environmental Quality (DEQ) has established a rated capacity of 36 million gallons per day for the City's WTP, which again far exceeds current and future finished water supply requirements for the City's service area.

In addition, while capacity under item d above for excess finished water storage has not been established, the City currently has enough finished water storage to supply more than 2 days of normal finished water supply requirements

Rule 1206 (R 325.11206) requires water systems to provide a means to continuously supply fully finished water during normal power service interruption. The City's WTP is now equipped with a redundant electrical system that includes provisions for stand-by power generation; thus meeting this requirement.

While additional means to meet the above requirements for capacity and power interruption can be provided through contracted interconnections with other water systems, the City has demonstrated compliance with these requirements without such means. However, the DEQ still supports and encourages such interconnections be maintained for emergency purposes as an additional barrier to help maintain public health protections. While these emergency

DEPARTMENT OF UTILITIES
Water Plant & Facilities

CITY OF FLINT & MDEQ
DISCUSSIONS OF FUTURE USE OF THE FLINT WATER TREATMENT PLANT

AGENDA

MAY 1, 2012
9:00 a.m. to 11:00 a.m.

1. Welcome / Introductions / Agenda Review
2. Co-mingling of treated Flint River water with water from DWSD — DEQ to comment
3. Co-mingling of Flint River water with raw water from KWA
4. Treating Flint River water full time and Flint going on it's own — Kick down the road more cost
5. Flint Water Treatment Plant being an emergency back-up for KWA — 1st choice - Sub Plan to DEQ → cap. mgt. etc.

* upgrade ↑ WTP CAP ≈ 45MGD if KWA signs

* we encourage water from whatever source to be comparable

Prysby, Mike (DEQ)

From: Busch, Stephen (DEQ)
Sent: Thursday, February 07, 2013 4:16 PM
To: Benzie, Richard (DEQ); Cook, Pat (DEQ); Prysby, Mike (DEQ)
Subject: RE: City of Flint emergency services contractor

Mike,

I didn't review the RFP, but the contractor should have to demonstrate some long term history of doing this type of work and having some other municipal references. (No good ol' boys club, or brothers-cousins-boyfriends contractors)

The City may also want to do a comparison of what their internal costs would be for the work. (I'm sure the DPW union will already be requesting this)

I am also in agreement with the responses from Pat and Richard.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

From: Benzie, Richard (DEQ)
Sent: Thursday, February 07, 2013 3:57 PM
To: Cook, Pat (DEQ); Prysby, Mike (DEQ)
Cc: Busch, Stephen (DEQ)
Subject: RE: City of Flint emergency services contractor

I pretty much agree with Pat except I would expect that the OIC for a distribution system would be providing oversight for the repair/maintenance crews even if they are "contract employees." That may not necessarily mean he's standing over the ditch in every case, but he should be there for major jobs and there should be periodic reviews of procedures and protocols that are being followed in the field. And he is certainly there to answer any questions or deal with unusual circumstances. I would also say that you could make that a point of emphasis in your discussions with the city about contractual services. Either the contractor should have an S-1 operator or they agree to follow city spec's and be subject to unannounced onsite inspections.

From: Cook, Pat (DEQ)
Sent: Thursday, February 07, 2013 2:00 PM
To: Prysby, Mike (DEQ)
Cc: Busch, Stephen (DEQ); Benzie, Richard (DEQ)
Subject: RE: City of Flint emergency services contractor

Hi Mike,

I'm not aware of any large water supplies like Flint that contract with outside companies for main/hydrant repairs and shut-off services. However, you may wish to post this question on the Team Room page to see if any other engineers have experience in this type of arrangement.

I think you raise some valid concerns about outside parties being able to repair breaks, especially about the testing (flushing, disinfection, sampling, etc.) that may be necessary after a main repair. As you know, it's not a one-size fits-all protocol and greatly depends on if the main was repaired under pressure or no pressure.

I don't think we can require the contractors to have licensed operators since the Operator Cert rules of Act 399 only require the OIC and designated backup to be licensed. DWSD has several crews that their only job is to find and repair main leaks/breaks. I'm not 100% sure, but I bet that very few if any one those guys have distro licenses and its highly unlikely that the OIC is providing oversight on each job.

I think we can raise the question to Flint about proving oversight by a city employee/licensed operator when the outside contractor is on site to see what they say, but my guess is that they are going to balk since that will cost them staff time and money.

pat

From: Prysby, Mike (DEQ)
Sent: Wednesday, February 06, 2013 4:22 PM
To: Cook, Pat (DEQ); Benzie, Richard (DEQ); Busch, Stephen (DEQ)
Subject: FW: City of Flint emergency services contractor

I am a bit concerned about the city of Flint considering the idea of privatizing water distribution system repairs. I am not aware of other communities that utilize outside contractors on the scale of systems like Flint. I have a few very small rural communities (ie village of Metamora) who contract with a company (United Water in Metamora's case) to operate and maintain the water system. United Water provides certified contractors. These independent contractors may some limited ability to conduct emergency repairs but it has been my experience that they contract out watermain repairs. The contract operator's role is to oversee the work to insure that proper procedures are followed (isolation, flushing, disinfection, sampling, notification, etc.).

Back to Flint.....my first take is that any outside vendor who will be conducting emergency services such as repairing broken mains and appurtenances should hold some level of water distribution certification. Although requiring them to hold an S-1 license may be asking too much.....some level of certification makes it more likely that contractor is aware of the proper procedures and the need to protect public health.

Other items:

- Require oversight of repairs by certified Flint water utility operator
- Security issues – vendor must constantly have access to as-built plans, general plan, access to Water Service Center
- Conformance to Flint standard specs – again verified by proper oversight
- Changes the city's focus trying to re-establish a "well-operated" water utility

If you are aware of other utilities of this scale that privatize emergency repairs, please share that with me. Also, if there are other items or concerns that this could raise, feel free to add them. Thanks.

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 335-6122

From: Daugherty Johnson [mailto:djohnson@cityofflint.com]
Sent: Wednesday, February 06, 2013 1:50 PM
To: Prysby, Mike (DEQ)
Subject: City of Flint emergency services contractor

Hello Mike. I have been directed to develop an RFP to have outside vendors under contract with the City for emergency services. The work could include anything from residential emergency turn offs to Main break repairs. Among the questions I have is what standards or qualifications would the State require of vendors? Also, how do other communities ensure adherence to State drinking water standards when vendors are performing the services. I have attached a general scope of services we intend to put out for bid. Your input would be greatly appreciated. Give me a call when you get a chance
(810) 577-8906 or email your thoughts.

Thanks
Daugherty 'Duffy' Johnson
Utilities Administrator

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

May 7, 2012

Mr. Howard Kroft, City Administrator
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

WSSN: 2320

Dear Mr. Kroft:

SUBJECT: Flint Water Treatment Plant – Future Operation

This letter confirms our May 1, 2012, meeting with you, Mr. Daugherty Johnson III, Utilities Administrator, Mr. Brent Wright, Water Plant Superintendent, and other water utility operators. Mr. Patrick Cook, Treatment Specialist, from the Department of Environmental Quality (DEQ), also attended the meeting.

The purpose of the meeting was to discuss options for blending treated water from the Flint River with water purchased from the Detroit Water and Sewerage Department (DWSD) or blending Flint River water with raw water purchased from the Karegnondi Water Authority (KWA) and subsequent treatment at the Flint Water Treatment Plant (WTP).

The city of Flint may elect to utilize their WTP for the blending of treated water from the Flint River with water purchased from DWSD or KWA provided that all applicable drinking water standards are maintained. Also, the city is encouraged to produce and distribute treated water that is comparable to the aesthetic quality of water purchased from DWSD. Various treatment parameters discussed in the meeting that the Flint WTP will be required to meet are listed in the bulleted items below.

- CT (disinfectant concentration times total contact time through the treatment process) must be maintained to provide not less than 99.9% (3-log) removal of giardia and not less than 99.99% (4-log) removal viruses.

- The residual disinfectant concentration in the water entering the distribution system shall not be less than 0.2 milligrams per liter for more than 4 hours.

- Filter effluent turbidity (combined filter effluent); Not less than 95% of the measurements taken each month shall be less than or equal to 0.3 ntu. Also, at no time shall the turbidity level exceed 1 ntu.

Prysby, Mike (DEQ)

From: Busch, Stephen (DEQ)
Sent: Monday, July 08, 2013 11:20 AM
To: Wurfel, Brad (DEQ); Copen, Leigh (DEQ); Shekter Smith, Liane (DEQ); Bloemker, Jon (DEQ); Willard, Veronica (DEQ)
Cc: Prysby, Mike (DEQ); Benzie, Richard (DEQ)
Subject: Media Inquiry - Flint WTP Engineering

I received a call this morning (July 8) from Dominic Adams, Flint Journal/Mlive. I called him back with Mike Prysby, District Engineer sitting in on the call.

Mr. Adams had obtained information that the City of Flint was contracting some engineering work for the Flint WTP, and the work was in part to potentially use the Flint River as a primary drinking water source.

I informed Mr. Adams that the City of Flint receives treated water from DWSD and has been since the 1960's, but has had the WTP available for reliability should the single transmission line system from DWSD fail. In an emergency the Flint WTP is already approved to use the Flint River for source water and is designed to meet all drinking water standards and public health requirements.

I also informed Mr. Adams that the engineering work in question would be to primarily enhance treatment capabilities beyond minimum requirements for the purpose of softening to provide customers with water quality consistent with what they already receive from DWSD. Some equipment for softening is already in place, but under emergency operation would not normally be used due to the time required for startup and fine tuning.

Mr. Adams asked whether the DEQ has approved or signed off on the proposed engineering work and on allowing the City of Flint to use the River as its source water. I explained that the ODWMA has not received a construction permit application for such work at this time, and that one would be required. I also indicated to Mr. Adams, that regardless of the source water, the City of Flint would be required to meet all applicable Drinking Water Standards and public health requirements and again that the WTP is already approved as a redundant supply to use the Flint River as a source water meeting all drinking water standards and that the WTP undergoes test runs on a quarterly basis to maintain the WTP.

Mr. Adams asked for more specifics regarding the treatment process and I explained that the removal of hardness for aesthetic water quality at this WTP is called lime softening.

Mr. Adams also inquired about the City being able to use the Flint River after the contract with DWSD terminates, and I indicated that may be one option, but they could also continue to purchase treated water from DWSD.

In Mr. Adams voicemail he mentioned a variance to use the Flint River, and I reiterated that there is no "Variance", but that the WTP has been constructed and approved to treat water from the Flint River to appropriate standards as needed.

Let me know if you have any questions.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

- The fluoride concentration in Flint's finished water must remain comparable to the fluoride concentration in DWSD's water.

- Suggested Practices recommends, and we fully endorse, monitoring WTP filters and plant tap for total colifom bacteria on a daily basis. In addition to plant tap monitoring, a protocol should be established for monitoring both treated water components prior to blending.

- Finished water must meet all other applicable Maximum Contaminant Levels for organic and inorganic parameters.

Based upon the 2007 Water Treatment Plant Sanitary Survey and the results of the most recent WTP test runs, we are confident that the WTP can meet the operational parameters discussed above. Given the installation of intermediate chlorination and improved ozone residuals, Flint's CT calculation will need to be updated.

Since Flint was not required to conduct the initial round of source water monitoring for cryptosporidium, treatment classification as part of the Long Term 2 Enhanced Surface Water Treatment Rule requirements has not been determined for the WTP. The next round of cryptosporidium monitoring begins in 2015 and subsequent bin treatment classification for Flint will be determined by 2017 (after completing 24 months of monitoring). Additional treatment for cryptosporidium may be required depending on the monitoring results.

Also, since DWSD would no longer be Flint's sole source of water, various water distribution system programs including Flint's Bacteriological Monitoring, Lead and Copper, and the Stage 2 Disinfectants and Disinfection Byproducts monitoring programs will change. Specific changes to these monitoring programs will be discussed in more detail after the city identifies the future operation of the Flint WTP.

The DEQ has no objection to blending Flint River water with water purchased either from DWSD or the KWA. This type of operation will place Flint's WTP into service on a full-time basis and be of benefit in several ways. Fulltime operation will help to ensure proper function and optimization of treatment while allowing WTP operators to accrue additional experience at operating and monitoring all unit processes. Fulltime operation also helps to keep treatment equipment and their components in a reliable state of operation.

Finally, a question was raised as to the extent that the city of Flint will be required to provide a full-time back-up water supply to the city and Genesee County. As we discussed, the average day demand (with restrictions on nonessential water use) for the combined needs of Flint and Genesee County will need to be met. Both capacity and hydraulics (transmission capabilities to Genesee County) need to be determined, as part of a basis of design towards proposing a full back-up water supply for both Flint and Genesee County.

Should you require further information, please contact me at the telephone number below; via e-mail at prysbym@michigan.gov; or Department of Environmental Quality, P.O. Box 30242, Lansing, Michigan 48909.

Sincerely,

Michael F. Prysby, P.E.,
District Engineer
Resource Management Division
Lansing District Office
517-335-6122

mfp:jir

cc: Mr. Daugherty Johnson III, City of Flint, Utilities Administrator
Mr. Brent Wright, City of Flint, Water Treatment Plant
Mr. Lonnie Lee, DEQ
Mr. Patrick Cook, DEQ

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

DAN WYA
DIRECTOR

December 21, 2011

Mr. Michael K. Brown, Emergency Manager
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

Dear Mr. Brown:

SUBJECT: Water Distribution System Operator Certification;
City of Flint; WSSN 02310

The purpose of this letter is to inform you of an operator certification deficiency that the City of Flint (the City) has not resolved concerning oversight of the city's water distribution system. Specifically, the Flint water distribution system must be overseen by a water distribution system Operator-in-Charge (OIC) having an S-1 drinking water certification. This deficiency began on July 31, 2011, when the city's S-1 certified OIC, Mr. Michael Brown (Utilities Administrator) retired.

The City was informed in our August 11, 2011, letter (copy enclosed) of the need to designate a new S-1 certified OIC for the water distribution system. The water distribution system OIC would be in overall charge of the water distribution system and would be responsible for making decisions regarding the daily operational activities of the water distribution system. Under standard operation, the water distribution system OIC shall be employed and available on a daily basis to oversee records maintenance and analysis, planning, monitoring, construction, and maintenance and to supervise and direct staff responsible for daily operations.

The City was offered the option to retain a temporary OIC, for short term operation, in the event that an S-1 certified OIC was not available. The temporary OIC would allow the City to remain in compliance with the S-1 certification requirement while the City either recruited a replacement or promoted an existing staff member to the OIC position. If the City was to retain a temporary OIC, we were to review a proposed scope of services prior to the City entering into a contact. If the City did not desire to promote a staff member to the position of OIC, then the City was to immediately pursue hiring a full-time OIC, such that the OIC was on staff within 6 months (February 11, 2012). To date, we have not received any communication from the City indicating that corrective action has been taken to resolve this deficiency.

In accordance to Section 9 (5) of the Michigan Safe Drinking Water Act, 1976 PA 399, as amended (Act 399) and the Administrative Rules, "A public water supply shall be under the supervision of a properly certified operator as specified in the rules." R 325.11905 (1) of the Administrative Rules states "Any waterworks system or a portion of a system which has been classified in accordance with R 325.11901 or R 325.11902 shall be under the supervision of an operator in charge certified in the system classification as specified in these rules." In accordance with R 325.11902, the City's water distribution system has an S-1 classification.

We are requesting that the City provide us a written response to this letter by January 15, 2012, as to how the deficiency in the operator certification requirements will be corrected by the February 11, 2012, deadline. The response should include a schedule by which compliance is to be achieved. Finally, we must also affirm our position that if the City does not intend to promote an existing staff member (currently holding an S-1 certification or able to obtain an S-1 certification within the next exam cycle) to the OIC position, then the City must have a newly hired S-1 OIC on staff by no later than February 11, 2012. Failure to correct this deficiency may result in escalated enforcement action.

Should you require further information, please contact me at the telephone number below; via e-mail at prysbym@michigan.gov; or Department of Environmental Quality, P.O. Box 30242, Lansing, Michigan 48909.

Sincerely,

Michael F. Prysby, P.E.,
District Engineer
Resource Management Division
Lansing District Office
517-335-6122

mfp:jir

cc: Mr. Howard Croft, City of Flint, Director of Infrastructure
Mr. Phil Mathews, City of Flint, Water Service Center
Mr. Rick Freeman, City of Flint, Acting City Engineer
Mr. John Craig, DEQ
Mrs. Bethel Skinker, DEQ

2310

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

Met w/ G. Eason & M. Brown on 10/13/2011 to discuss temp OIC reqs.

August 11, 2011

Mr. Gregory A. Eason, City Administrator
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

Dear Mr. Eason:

SUBJECT: Water Distribution System Operator Certification, City of Flint

It was brought to our attention that the city of Flint's water distribution system Operator-in-Charge (OIC), Mr. Michael Brown (Utilities Administrator), has retired from the city effective July 31, 2011. Mr. Brown's retirement raises the issue of operation and maintenance oversight of the Flint water distribution system by an S-1 certified operator.

By definition, the water distribution system OIC is a properly certified operator who is designated by the city as the responsible individual in overall charge of the water distribution system and who makes decisions regarding the daily operational activities of the water distribution system that will affect the quality or quantity of drinking water. Under standard operation, the water distribution system OIC shall be employed and available on a daily basis to oversee records maintenance and analysis, planning, monitoring, construction, and maintenance and to supervise/direct staff responsible for daily operations. Specifically, the city of Flint is required to have an S-1 certified operator be designated as the OIC and oversee the operation and maintenance of the water distribution system.

The city will need to designate a new water distribution system OIC with an S-1 certification. The city also needs to designate a back-up operator. Enclosed is an Operator and Back-up Operator Designation Form. Please complete the form and return it to our office.

Next, in the event that an OIC is not available to meet the standard operation criteria, it will be acceptable, for short-term operation, for the city to recruit a replacement or promote a staff member to the OIC position. During this interim period, the city must retain a temporary OIC having an S-1 certification to visit the water supply system at least twice a week, to be on-call 24 hours per day, and supervise/direct staff responsible for daily operations. The following conditions also apply:

- If the city wishes to promote a staff member to be the OIC after the staff member has achieved proper certification, this individual must first qualify to write the S-1 certification examination when it is next offered (November 2011). If this individual fails the examination, the city must immediately pursue the hiring of a full-time OIC.

- If the city does not desire to promote a staff member to be the OIC, then the city must immediately pursue hiring a full-time OIC. The OIC must be on staff within 6 months.

Finally, if the city retains a temporary OIC, we would appreciate an opportunity to review the scope of services if the city enters a new contract.

Should you require further information, please contact me at the telephone number below; via e-mail at prysbym@michigan.gov; or Department of Environmental Quality, P.O. Box 30242, Lansing, Michigan 48909.

Sincerely,

Michael Prysby

Michael F. Prysby, P.E.,
District Engineer
Resource Management Division
Lansing District Office
517-335-6122

mfp:jir

cc: Mr. Phil Mathews, City of Flint, Water Service Center
Mr. Peter Bade, City of Flint
Mr. Mark Joseph, DEQ

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

June 20, 2011

Mr. Brent Wright, Plant Supervisor
City of Flint, Water Plant
4500 North Dort Highway
Flint, Michigan 48505

Dear Mr. Wright:

SUBJECT: City of Flint Water System

This letter confirms my visit you and Mr. Michael Glaskow on June 9, 2011. The purpose of the visit was to conduct routine water system surveillance and to observe a routine water treatment plant (WTP) test-run. The status of various water related concerns were discussed during the visit and these are discussed in more detail below.

1. A routine WTP test-run was being conducted and, based upon the site visit, finished water turbidity and total coliform treatment objectives were being achieved. Specific operating parameters along with an overall summary of the test-run will be provided to us in the test-run report. Finally, we have not received the reports for the WTP test-runs completed since 2010. It is our understanding that three test runs were performed in 2010 and two (including the current test run) in 2011. Please provide us with a copy of these WTP test run reports. Finally, we are pleased with the commitment put forth to conduct routine WTP test-runs and we encourage the city to maintain this level of commitment.

2. WTP staff are continuing to work on the WTP Standard Operating Procedure (SOP) for routine test-runs and pipeline emergencies. Please provide us with a copy of the SOP after it is completed.

   Next, WTP staff and Water Service Center (WSC) staff are working to complete the water system Emergency Response Plan (ERP). Again, please provide us with a copy of the ERP for our review and approval.

   Finally, a mock Improved Explosive Device (IED) Attack on the Flint WTP was conducted on May 12, 2011. The mock exercise tested the response, coordination and communications between the City of Flint, Genesee County first responders, and state departments. The DEQ, however, was not notified of the mock incident due to a breakdown in communication during changes in

emergency oversight at the WTP. It is our understanding that WTP staff are making further changes to the water system ERP to include specific instructions confirming that all critical contacts have been notified.

3. Based upon our discussion, Phase II of the reliability study is nearly complete. We look forward to reviewing the second phase of Flint's reliability study when it becomes available. Finally, it is also our understanding that the amended Phase I report will be included with the Phase II report.

4. The 2011 Drinking Water Infrastructure Needs Survey was sent to the city in March 2011. It is our understanding that WTP and WSC staff are working to complete the survey by the end of June. We encourage the city to complete and return the survey to our office within the next several weeks.

Finally, the city of Flint continues to investigate its long-term source for drinking water. Options for future water supply source include; continued service from Detroit, establishing a new surface water source from Lake Huron – Karegnondi project (as a joint venture with other communities), or utilization of Flint's existing resources. As we discussed in our previous letter, each option will require a certain level of WTP and pumping station operation. Please keep us updated concerning the city's progress towards identifying the most practical alternative for its long-term source for drinking water. We will also to continue to meet with you and your water department staff on a quarterly basis to review the issues and the efforts concerning the city's water system.

Should you require further information, please contact me at the telephone number below; via e-mail at prysbym@michigan.gov; or Department of Environmental Quality, P.O. Box 30242, Lansing, Michigan 48909.

Sincerely,

Michael Prysby

Michael F. Prysby, P.E., District Engineer
Environmental Resource Management Division
Lansing District Office
517-335-6122

mfp:jir

cc: Mr. Gregory Eason, City of Flint
Mr. Mike Brown, City of Flint

RICK SNYDER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES & ENVIRONMENT
LANSING

February 17, 2011

Mr. Gregory A. Eason, City Administrator
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

Dear Mr. Eason:

SUBJECT: City of Flint Water System

This letter confirms our meeting on February 10, 2011, with Mr. Mike Brown, Mr. Brent Wright, Mr. Rick Freeman from Rowe Incorporated, and yourself at the Flint Water Treatment Plant (WTP). The purpose of the meeting was to conduct routine water system surveillance. The status of various water related concerns discussed in our meeting and further actions necessary to correct them are discussed in more detail below.

- **Water system Emergency Response Plan (ERP)/WTP Standard Operating Procedure (SOP)** – A draft copy of the city's water distribution system contingency plan and the WTP SOP for routine test-runs and pipeline emergencies was provided to us. Several questions/comments were noted during our review of each plan and were discussed during the meeting. The questions/comments were noted on each document and provided to Mr. Wright. The questions/comments should be answered as part of preparing final versions of each plan.

  Next, changes to the Administrative Rules of the Michigan Safe Drinking Water Act, 1976 PA 399, as amended, now require an ERP in place of the contingency plan. The ERP provides an outline to follow in the event of a water related emergency (loss of pressure, contamination, etc.). The ERP is similar to a water system contingency plan; however, various types of programs/plans pertaining to water utility operation need to be referenced in the ERP. An electronic copy of the ERP template was sent to Mr. Wright and can be used for preparing Flint's ERP. We will review the completed ERP during our next routine surveillance visit.

  Finally, we concur with the idea of dividing the WTP SOP into two separate SOPs for each mode of WTP operation. Specifically, a separate SOP will be established for routine test-run operation and emergency plant production. Please provide us with a copy of each SOP when they are completed.

- **Reliability study** – Based upon our discussion, Phase II of the reliability study is nearly complete. Phase II is to include various alternatives for recommended capital improvements. Asset management principals will also be included. We look forward

to reviewing the second phase of Flint's reliability study when it becomes available. It is also our understanding that the Phase I report was amended following our review comments. Please provide us with a copy of the amended Phase I study.

- **Booster pumping station deficiencies** – Based upon our discussion, improvements to the Torrey Road and Cedar Street pumping stations will be resubmitted as part of Flint's 2011 Drinking Water Revolving Fund (DWRF) application. A revised project plan that clearly identifies the need for the station upgrades, along with all of Flint's other 20-year water system needs, will need to be prepared. The project plan will also include some distribution system improvements. The city should also take the opportunity to utilize the reliability study for additional documentation in support of the projects that are included in the project plan. Finally, given the uncertainty of Flint's long-term pumping needs at Pump Station No. 4, no immediate improvements are planned for this facility.

  While there is uncertainty over the degree of long-term use of Pump Station No. 4, this station is critical for today's water supply operations. Continued effort is needed now to ensure adequate reliability of Pump Station No. 4 and its respective storage reservoirs, especially during emergency operation.

- **WTP Test Runs** - Routine WTP test runs continue to be conducted on a quarterly basis. Each test run increases the experience and confidence of plant operators to further assure that plant production water meets all applicable drinking water standards. Based upon our discussion, treatment continues to improve with each test run. Given the importance of maintaining the familiarity with treatment plant operation, and the potential of needing to place the WTP into emergency operation to distribute treated water to the public, WTP test runs need to continue on a quarterly basis. Finally, please provide us with copies of the 2010 WTP test run reports

- **Operator Certification** – WTP operator Mr. Mike Glaskow has obtained the F-1 certification and has been designated as the Operator-In-Charge (OIC). As OIC, Mr. Glaskow will be responsible for reviewing and signing the following monthly/annual reports:

  - Monthly Operation Reports
  - Consumer Confidence Report and Certification Form
  - Lead/Copper Reporting Form
  - Annual Pumpage Report

  Next, with Mr. Glaskow obtaining the F-1 certification, the city has achieved full compliance with the F-1 certification requirement. It is also our understanding that the city has discontinued their mutual aid agreement with Genesee County for operator assistance during routine test runs; however, the county is available to assist, as needed, during emergency operation. We encourage the city to maintain the availability of assistance from Genesee County during emergency operation.

- **Infrastructure Needs Survey** - The 2011 Drinking Water Infrastructure Needs Survey will be sent to Flint in March 2011. We encourage the city to complete and return the survey to our office. As always, we are available to meet with you to discuss various water related projects that could be included in the survey as part of

Flint's overall 20-year needs. The city should also take the opportunity to utilize the reliability study for additional documentation in support of the projects that are included in the needs survey. Finally, our department will be providing several training sessions to assist in completion of the 2011 survey. The city will be provided with additional information pertaining to the training sessions when it becomes available

- **Future Water Source** – The city of Flint is faced with the challenge of determining its long-term source for drinking water. Options for future water supply source include; continued service from Detroit, establishing a new surface water source from Lake Huron – Karegnondi project (as a joint venture with other communities), or utilization of Flint's existing resources. Each option will require a certain level of WTP operation. The level of treatment and scope of improvements at the WTP will need to be carefully evaluated as part of selecting the most suitable option. Other important factors include; short-term source(s) of supply, residuals management (correcting the violations at the Bray Road sludge lagoons vs. on-site treatment), and available source capacity (Lake Huron supply and Flint River watershed).

We appreciate having the opportunity to meet with you to discuss the status of Flint's water system and the challenges that lie ahead. Finally, we will to continue to meet with you and your water department staff on a quarterly basis to review the issues and the efforts concerning the city's water system.

Should you require further information, please contact me at the telephone number below; via e-mail at prysbym@michigan.gov; or Department of Natural Resources and Environment, P.O. Box 30242, Lansing, Michigan 48909.

Sincerely,

Michael F. Prysby, P.E., District Engineer
Environmental Resource Management Division
Lansing District Office
517-335-6122

mfp:jir

cc: Mr. Mike Brown, City of Flint
Mr. Brent Wright, Flint Water Plant
Mr. Rick Freeman, P.E., Rowe Incorporated
Mr. Brian McKenzie, Genesee County Health Department

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES & ENVIRONMENT
LANSING

RICK SNYDER
GOVERNOR

February 17, 2011

Mr. Michael Brown, Utilities Administrator
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

Dear Mr. Brown:

SUBJECT: Customer Site Piping

The Department of Natural Resources and Environment, Environmental Resource Management Division (DNRE), has received a schematic from Alpine Engineering, Inc., detailing a proposed watermain relocation within the city of Flint. An existing 8-inch main is to be relocated to allow for construction of the proposed Department of Human Services (DHS) office building. The question was raised as to whether a construction permit would be needed to relocate the existing main.

Based upon the schematic, and that the size of the main is not being changed, a permit would not be required by our office. However, it was brought to our attention that the relocated watermain (approximately 555 feet) will be privately owned. Also based on the drawing, the private main (referred to as "customer site piping") will be connected to the city of Flint's water distribution system at both ends. Our primary concern with customer site piping with more than one connection to the municipal water system is establishment of a "flow through" situation. As water enters a private main, the utility gives up control of the water and it has the potential to re-enter the municipal system at the other connection(s). There is the potential for the degradation of water quality in a privately owned system, thus the DNRE does not allow private ownership of watermains where flow-through situations can exist. Finally, failure of the utility to acquire ownership of customer site piping where a "flow through" condition exists, is a violation of Section 325.1005a, Sec. 5a (1) of the Michigan Safe Drinking Water Act 1976 PA 399, as amended, Michigan Compiled Law 325.001 *et seq.*

The watermain proposed to serve the DHS building needs to become publically owned and maintained by the city of Flint. This will call for the establishment of a public watermain easement or right of way in this area. Any easements that are obtained need to be documented and a copy provided to us.

Next, if the city of Flint is unable or unwilling to assume ownership of this watermain, then it will remain customer site piping. We are in the position to allow a utility to make more than one connection to customer site piping provided that double check valve assemblies are installed at each point of connection. These devices will need to be located within a concrete vault to ensure proper operation and protection. We would also suggest that a master meter be installed in the vault. Adequate valving must be installed to allow for removal of the device during maintenance.

Finally, in lieu of installing double check assemblies, the city of Flint may elect to establish an operating/maintenance agreement with the owner of the customer site piping. The contract would allow the city to have sufficient control of the main in terms of maintenance and repair without actually owning it. Enclosed is an example of an operating agreement established between the owner of customer site piping and a municipality. If the city elects to establish an operating agreement, a copy of the operating/maintenance contract needs be sent to us for review and comment.

Should you require further information, please contact me at the telephone number below; via e-mail at prysbym@michigan.gov; or Department of Natural Resources and Environment, P.O. Box 30242, Lansing, Michigan 48909.

Sincerely,

Michael F. Prysby, P.E.
District Engineer
Environmental Resource Management Division
Lansing District Office
(517) 335-6122

mfp:jir

Enclosure
cc: Ms. Shiloh Dahlin, Alpine Engineering, Inc,

STATE OF MICHIGAN

DEPARTMENT OF NATURAL RESOURCES & ENVIRONMENT

JENNIFER M. GRANHOLM
GOVERNOR

LANSING DISTRICT OFFICE

REBECCA A. HUMPHRIES
DIRECTOR

March 31, 2010

Mr. Gregory A. Eason, City Administrator
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502

WSSN: 2310

Dear Mr. Eason:

SUBJECT: City of Flint Water System

This letter confirms our meeting on March 30, 2010 with you, Tom McCabe, Michael Brown and Brent Wright. Mike Prysby from our office was also present. The purpose of the meeting was to discuss the overall status of the city of Flint water system and some of the items of immediate concern. An information packet containing a summary outline, recent correspondence, and copies of the Flint Water Treatment Plant and Distribution System Sanitary Surveys was provided to you during the meeting.

We appreciated the opportunity to meet with you, and we look forward to working with you and your water utility staff toward accomplishing additional water system improvements. The city has made good progress over the last year or so, and we hope the ongoing efforts will continue.

Finally, we discussed the possibility of meeting with you and available members of the Flint city council at the Flint Water Treatment Plant during a routine test run to help reinforce the importance of the treatment plant and to answer any questions about the facility or the water system. Please let us know if you wish to pursue this type of visit.

Please feel free to call if you have any questions concerning the topics that were discussed during the meeting. You may contact Mike Prysby at 517-335-6122 or you may contact me at the number provided below.

Sincerely,

Timothy A. Benton, P.E., District Supervisor
Lansing District Office
Field Operations Section
517-335-4523

tab:smb

cc: Mr. Tom McCabe, DPW Director, City of Flint
Mr. Michael Brown, City of Flint
Mr. Brent Wright, City of Flint
Mr. Michael Prysby, DNRE

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

December 21, 2009

Mr. Tom McCabe, DPW Director
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

WSSN: 2310

Dear Mr. McCabe:

SUBJECT: City of Flint Water System
Sanitary Survey Update
Water Treatment Plant, Water Distribution System

This letter confirms our meeting on December 2, 2009 with you, Michael Brown and Brent Wright. Jeff Bryson from the Genesee County Drain Commissioner's office and Rick Freeman from Rowe, Incorporated were also present. Mr. Timothy Benton from our office was also present. The purpose of the meeting was to update the City of Flint 2007 Water Treatment Plant Sanitary Survey and the 2008 Water Distribution System Sanitary Survey.

In general, each survey covers the major aspects of Flint's water system including: stand-by facilities, distribution, source capacity, and storage. The purpose of this letter is to emphasize the water related items posing the most concern. These items are discussed in more detail below.

WATER TREATMENT PLANT

1. Hamilton Dam – The city's consultant, Stantec has recommended replacement of the Hamilton Dam with construction of a new concrete spillway. Prior to completing the spillway's design, the minimum pool depth upstream of the dam necessary to allow operation of the Water Treatment Plant (WTP) at its rated capacity (36 million gallons per day (MGD) needs to be determined. It is our understanding that WTP staff will be coordinating efforts with their consultant in performing pump tests at the low service (LS) pumping station in conjunction with various levels in the Flint River to determine the minimum pool depth elevation. WTP staff also needs to either obtain or prepare the pump curves for each of the LS pumps. The pump tests at LS need to be completed since this information plays a vital role in establishing the design height of the new spillway. Also, we encourage WTP staff to take the opportunity to operate all of the LS pumps during the test to further determine the reliability of the LS pumping station. Finally, we look forward to reviewing the results of the pump test and the amount by which the river can be lowered without impacting the WTP's ability to operate at its rated capacity.

2. High Service (HS) Pumping – HS pumps #1 and #2 at Pump Station No. 4 are not available for service. The remaining pumps (HS Pumps #7, #8, and #9) provide a total and firm (available capacity with the largest pump out of service) HS pumping capacity of 46 and 26 million gallons per day (MGD) respectively. Based upon our discussion, HS Pumps #7, #8, and #9 are in good operating condition.

   We are comfortable with the total and firm HS pumping capacity to meet Flint's water usage in the event of an emergency repair to the 72-inch pipeline. The firm HS pumping capacity, however, falls somewhat short in meeting the combined needs of Flint and Genesee County during a pipeline emergency.

   While we all agree that additional HS pumping capacity would be needed to meet the combined needs of the city and Genesee County, HS pumping capacity will be a function of the station's future level of use. The station's future level of use is uncertain at this time due to Genesee County's plan to utilize Lake Huron as their future source of water (Karegnondi Project) and Detroit's plan to provide a second transmission main from Detroit (Flint Transmission System – FTS and North Oakland Transmission System – NOTS projects). When the outcome and design of these projects become more certain, the intended future use level of HS pumping needs to be evaluated to determine the amount of HS pumping capacity that will be needed.

3. Operator Certification – We are pleased that the city has taken corrective action to address the deficiency in operation certification at the WTP. Specifically, a "memo of understanding" has been established with Genesee County that authorizes an F-1 operator from Genesee County to oversee operation of the WTP during emergency operation. It is our understanding that Dave Jansen and/or Jeff Bryson are the designated operators-in-charge (OIC) during emergency operation. Please provide us with a copy of the memo of understanding with Genesee County regarding operator oversight at the WTP. Also, operation reports specific to emergency operation of the WTP need to be signed by the designated OIC. Next, we are also supportive of F-1 oversight from the county during routine WTP test-runs and we encourage the city to continue this practice. Routine WTP operation during plant downtime can be covered with the city's current certification status. Finally, the routine monthly operation report may continue to be signed by Brent Wright.

4. Water System Contingency Plan – Based upon our discussion, WTP staff are preparing a contingency plan specific to emergency operation of the WTP. The plan identifies the parameters necessary for implementation of WTP operation and will establish a set of standard operating procedures. The plan should also take into consideration the different types of pipeline emergencies that could arise and how each scenario will affect operation of the WTP. Coordination of remedial activities between the WTP, Water Service Center (WSC), and Genesee County operators should also be outlined in the WTP contingency plan.

Next, a separate water system contingency plan specific to other types of distribution system emergencies (contamination, backflow, pressure loss, etc.) is also being prepared. This plan is being based on our contingency plan format that was provided to city earlier this year.

Finally, both contingency plans are expected to be completed by early 2010. Please send us a copy of each plan for our review.

5. Intermediate Chlorination – During 2009, the WTP was placed into emergency operation twice and treated water was distributed to Flint's water distribution system. Intermediate chlorination was added on a temporary basis in order to provide a higher level of assurance that the drinking water being supplied to the city met the drinking water standards for coliform bacteria. The benefits of intermediate chlorination were especially realized during the WTP's August – early September 2009 emergency operation. The presence of chlorine through the majority of the treatment process provided the level of assurance needed to avoid having to issue a system-wide boil water advisory.

   We strongly support WTP staff with their intent to provide intermediate chlorination on a permanent basis. Various options for intermediate chlorination including a tablet feed system (pellet or erosion type) or a small scale chlorine gas system are being investigated. Prior to installing an intermediate chlorine feed system, a completed permit application along with a proposal (plans, specs, basis of design) needs to be sent to our office. Following our review and approval, a construction permit will be issued for the proposed work.

   Finally, intermediate chlorination will require provisions for dechlorination of the filter to waste effluent. Dechlorination is necessary in order to maintain compliance with the NPDES discharge limits for the discharge of treated water to the Flint River during routine WTP test runs. WTP staff is investigating options for a dechlorination system. Finally, prior to installing a dechlorination system, a construction permit will be issued for the proposed work.

WATER DISTRIBUTION SYSTEM

1. Water System Reliability Study – Based upon our discussion and the Water System Reliability Study Project Summary, Phase I of the reliability study is expected to be completed in January 2010. Items that were completed in Phase I included a detailed water system general plan showing the locations of hydrants, valves, storage facilities, pumping stations, etc. Also completed are the updated hydraulic model and the flow tests to calibrate the model. Finally, a 6-year capital improvements plan (CIP) is being prepared as part of the first phase of the study. We look forward to receiving a copy of the first phase of study for our review and comment.

The second and third phases of the reliability study include distribution system and WTP asset management and establishment of a 20-year CIP. We encourage the city to continue to put forth the effort with their consultant towards completing the reliability study and following through with the recommended improvements.

2. Valve Program – We are pleased with the effort put forth by the WSC towards improving the water system valve program. The approximate location of all water system distribution system valves have been entered into city's GIS system and are also noted on the base map. Also, the exact location of each valve is nearly two-thirds complete.

   The next major step towards improving the valve program is to determine the operating condition of each valve and enter this information into the database system. This step will be initiated after all of the valve locations have been confirmed. Finally, the second phase of the reliability study will establish a valve maintenance program.

   We encourage the city to continue working with their consultant towards obtaining the critical information that is needed to establish a complete recordkeeping system for distribution system valves. The city will also need to determine the level of staffing that will be needed in order to maintain an adequate valve maintenance program.

3. Pumping Stations – The city has not proceeded with rehabilitation of the electrical system at the Cedar Street pump station or replacement of the Torrey Road pump station. Although the objective was to finance the project with drinking water revolving funds (DWRF) and a construction permit was issued, these projects did not proceed due to the city's current bond debt.

   While we understand the city's concern of increasing their bond debt, the condition of both stations and their limited operating reliability raises concern. The Cedar Street station's electrical switchgear is clearly outdated and needs to be replaced. Also, provisions for stand-by power were provided as part of the DWRF project. Next, the Torrey Road pump station has only one reliable pump for operation and this facility plays a critical role in providing adequate water service to the western portion of the city including the Hospital Hill area. Finally, stand-by power was also included in the Torrey Road project.

   It is our understanding that the city intends to replace the electrical switchgear at the Cedar Street PS next summer. The city is also considering rehabilitating the existing pump station at Torrey Road as opposed to constructing a new facility. The upgrades would include new pumps and motors, controls, and valving. We would be agreeable to an upgrade of the existing station based on the scope of work that was discussed. Upgrades to the Torrey Road pump station would proceed in 2011.

Finally, discharge piping and valving improvements have not been completed at the Westside PS. This work needs to be completed in order to reduce water hammer and subquent main breaks in areas downstream from the station. It is our understanding that work on the Westside PS will be proceed following completion of the work at the Cedar Street and Torrey Road PSs.

We are agreeable to the approximate timeframes to correct the deficiencies at each of the pumping stations. We would be interested, however, in receiving a schedule for each project.

It is evident that the city has taken some serious steps towards identifying various water system deficiencies and investigating corrective action options. We are also pleased with the improvement in WTP operation during 2009 and the ability of the WTP and its staff to provide an emergency supply of drinking water to the city that met all of the applicable drinking water standards.

We also wish to remind the city that much work remains to be completed. The city needs to meet the financial challenges in completing water system infrastructure projects and improving utility operations. Given the improvements made in WTP operation, operator certification, valve program, and the progress made with the reliability study, Flint's water system has improved to a **"Marginal"** rating. The amount of effort and progress that is put forth over the next 24 months, especially in the key areas discussed in this letter, will determine whether Flint's water system rating improves further or declines.

We appreciate the time taken to meet and discuss the current status of the city water system and we look forward to working with you on these water related issues. If you have any questions concerning these items or on any other water related matter, please don't hesitate to call me at the number provided below.

Sincerely,

Michael Prysby

Michael F. Prysby, P.E., District Engineer
Water Bureau
Field Operations Section
517-335-6122

mfp:smb

cc: Mr. Michael Brown, City of Flint
Mr. Brent Wright, City of Flint
Mr. Brian McKenzie, Genesee County Health Department

CORR file-GS

DEPARTMENT OF UTILITIES

Michael K. Brown
Acting Mayor

Brent Wright
Water Plant Supervisor

June 2, 2009

RECEIVED
JUN 0 8 2009
Environmental Science & Services Division

Kurt Swendsen
Municipal Facilities Section
Environmental Assistance Division
P.O. Box 30457

Kurt:

Enclosed please find an executed change order number four (4) adopted February 23, 2009. Change order number four reduces the Sorenson Gross contract by $25,000.00 . The reduced amount was the cost to provide ozone electronic/computer upgrades and remote operation for the Ozonia installed ozonation system.

The City of Flint in part has contracted professional services from Motor City Electric Technologies Inc. (MCETI), to provide emergency services to the Ozonia equipment on an as needed basis. As needed services were required by the City of Flint to resolve safety emergency issues on the Ozonia equipment by a certified Ozonia contractor. In the State of Michigan, MCETI is the only certified professional service provider.

The use of the deducted $25,000.00 by the City of Flint, is to provide electrical/computer upgrades and remote operation on the installed Ozonia equipment. These changes are required for the efficient operation and Sorenson Gross couldn't provide the service. In addition, City staff will provide assistance to MCETI, on a force account basis to ensure transfer of knowledge. The total cost of the City force account and MCETI will not exceed $25,000.00

We hope to have the work completed by the end of August 2009. If you have any questions feel free to contact me at (810) 787-6537. We thank you for your attention in this matter.

Respectfully submitted,

Brent Wright

Enclosure: Change Order #4

cc: DLZ

File # 2310-25

Michael K. Brown
Acting Mayor

CITY OF FLINT
WATER TREATMENT PLANT

RECEIVED
MAY 20 2009
MDEQ-Water Bureau
Lansing Office

May 14, 2009

Mike F. Prysby, P.E.
MDEQ
525 W. Allegan St.
P.O. Box 30242
Lansing, MI. 48909-7742

Dear Mr. Prysby:

SUBJECT: City Of Flint WTP OIC

In response to your letter of April 24, 2009, the City Of Flint is in the process of drawing up a contract with Genesee Co. WWS to obtain the use of an F1 operator. The F1 operator will oversee and advise the operation of the plant during scheduled test runs. If an emergency exists and water is introduced to the distribution system, the WTP staff will be under the direction of the OIC. The OIC will also review and sign the MOR. I believe an agreement and or contract will be signed before the June 1st dead line you imposed. The City Of Flint will send a confirmation letter and copy of the agreement upon its implementation.

Sincerely,

Brent F. Wright, Supervisor
City Of Flint Water Plant
4500 N. Dort Hwy.
Flint, MI 48505

MFP file
Cookfile - yes

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

April 24, 2009

Mr. Michael K. Brown, Acting Mayor
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

WSSN: 2310

Dear Mr. Brown:

SUBJECT: City of Flint Water System – Operator Certification

We have been alerted to the decision by the City of Flint to end the contact with Carlyon Consulting effective May 8, 2009. The purpose of the contract was to provide the Flint Water Treatment Plant (WTP) with an interim operator in charge (OIC) having the required F-1 complete treatment certification. The service contract was established in order to allow the city to remain in compliance with the requirement for a properly certified operator at the Flint WTP pursuant to the Michigan Safe Drinking Water Act, Act 399 P.A. 1976, as amended, and the Administrative Rules.

We have worked closely with the city and WTP staff over the past few years towards obtaining a properly certified OIC. The certified OIC plays a major role in assisting the plant operators in demonstrating the WTP's ability to produce drinking water that meets the applicable state and federal drinking water standards. The ability of the WTP to produce quality drinking water is critical in the event of an interruption in supply from the Detroit Water and Sewerage Department transmission line. The city has invested over $40 million in the standby water treatment plant but highly qualified and experienced operators are absolutely essential to make the facility function satisfactorily.

We have noted that with the assistance of Carlyon Consulting WTP performance has improved during the most recent plant test-run. We have also noted that the frequency of repairs to the 72-inch diameter transmission pipeline have increased, thus the need for adequate WTP operation will always remain a concern provided that the pipeline remains the only source of drinking water for Flint.

If the city terminates the contract with Carlyon Consulting, a new OIC having a current F-1 certification should be retained as soon as possible but by no later than June 1, 2009. In addition, we would appreciate an opportunity to review the scope of services if the city enters a new contract.

If you have any questions regarding this issue or any other drinking water related matter, feel free to call me at the number provided below.

Sincerely,

Michael F. Prysby, P.E., District Engineer
Lansing District Office
Field Operations Section
Water Bureau
517-335-6122

cc: Mr. Brent Wright, Flint Water Plant
Mr. Robert Carlyon, Carlyon Consulting
Mr. Brian McKenzie, Genesee County Health Department

CBR-Pole - 5/6

CITY OF FLINT

Michael K. Brown
Acting Mayor

April 7, 2009

Mr. Robert Carlyon, President
Carlyon Consulting
12418 Carpenter Road
Flushing, Michigan 48433

Dear Mr. Carlyon:

Please allow this communication to serve as the official thirty day written notification to end your current contract with the City of Flint. As such, your contract with the City will end effective Friday, May 8, 2009 at 5:00 p.m.

On behalf of the City of Flint, I would like to thank you for your service and wish you much success in your future endeavors. Please make arrangements with Deirdre G. Pitts, Human Resources and Labor Relations Director to return all City property within your possession. Thank you in advance for your professional cooperation.

Sincerely,

Michael K. Brown

Michael K. Brown
Acting Mayor

MKB:mm

Corr file - yes MFF

DEPARTMENT OF UTILITIES
Water Plant & Facilities

RECEIVED
MAR 11 2009
MDOT Lansing Post Office

Michael Brown
Mayor

Brent Wright
Provisional Supervisor

Mr. Michael Prysby, P.E., District Engineer
Lansing District Office
Field Operations Section
Water Bureau
PO Box 342
Lansing, MI 48909-7742
March 6, 2009

Dear Mr. Prysby;

SUBJECT: City of Flint Water System

This letter contains responses to several issues discussed in your letter dated February 5, 2009. A number of items have been impacted by the recent change in Administration of the City of Flint. The City no longer employs Mr. Lyle Hippensteel. Mr. Darryl Buchanan has been reassigned within the administration. For some unknown reason, your letter dated February 5, 2009 was not delivered to Mr. Mike Brown or Mr. Brent Wright. They only became aware of its existence late last week when Mr. Rick Freeman mentioned the subject.

Mr. Brent Wright and Mr. G. Robert Carlyon have scheduled test operations of the Water Plant beginning on Monday, March 9, 2009 and concluding on Saturday, March 14, 2009. The ozone system has undergone recent reprogramming and this will be the first opportunity to familiarize the staff with the revised operational parameters. As itemized in the recent Water Plant Sanitary Survey, the two larger low service pumps (those rated at 25 MGD and 30 MGD) will be operated to determine their readiness for service. Mr. Brent Wright has successfully revised job descriptions at the Water Plant that will create an ongoing class of dual-purpose employees whose job duties will encompass both operational and maintenance activities. Several employees engaged in this training series will be applying to test for F-4 certification in May. In a continuing and expanding program of encouragement of operator training and certification, several other staff members who currently hold certifications have applied to take more rigorous exams this spring.

With the above news, Mr. Brown, Mr. Wright and Mr. Carlyon would like to invite both you and some staff member from Operator Certification and Training to accompany you during the test operation. The unique status of the Flint Water Plant in dividing its time as a treatment facility and a distribution facility spanning the conventional boundaries between Class F and Class S water facilities needs to be considered when reviewing applications for certification testing.

With regard to the water system reliability study, a City Council resolution to enter into a contract to conduct such a study and provide written reports of the results has been prepared. The initial signature and approval process is currently underway prior to submittal to the Council for approval.

The bids for the relocation and expansion of the Torrey Road Pump Station have been reviewed. The low bidder was nearly double the engineer's estimate of project cost, creating a review of the plans and specifications to trim costs. Other members of the Utilities Department staff and Rowe Professional Services have been involved in revising the plans and specifications for rebidding the project. The City of Flint remains optimistic that this project can be completed within the 2009 construction season.

The Water Service Center continues to have one employee dedicated to inputting the data collected by other members of the staff with regard to the location and condition of valves within the system.
We have attached a copy of a document prepared and provided by MDEQ to the City of Flint regarding the scope of services to be provided by the "Interim" Operator-In-Charge of the Flint Water Treatment Plant. Please use Mr. Brent Wright as your contact as the provisional Water Treatment Plant Supervisor. Mr. Wright is applying for certification as an F-2 Water Treatment Systems Operator by taking the test in May of this year. He has actively pursued the education requirements suggested by the MDEQ and is currently scheduled to take another MDEQ course next month. Because he has over nineteen years experience in the maintenance and operation of the Flint Water Plant, we feel confident in his ability to gain the appropriate certification level soon. In the meantime, Mr. Carlyon visits the facility one or more times per week routinely. He reviews the MOR, and has recently taken over a greater role in the Hamilton Dam replacement project by assisting in the development and review of a formal "Request for Qualifications" document, review criteria and a scoring matrix to allow the City to chose an engineering firm to finalize the scope of services and develop plans and specifications of the resulting construction project.

We remain confident of your assessment during the January 21, 2009 meeting that the City seemed to be making considerable progress toward upgrading the status of the water system from a regulatory compliance standpoint. We remain likewise confident that our efforts will result in a comprehensive review of the system within the upcoming year that will minimize the deficiencies previously noted and restore Flint to compliance with the appropriate regulations.

Yours truly,

Michael Brown,
Utilities Administrator
City of Flint

Brent Wright,
Provisional Water Plant Supervisor
City of Flint

G. Robert Carlyon,
Operator in Charge
Flint Water Plant
MDEQ Certification S-1, F-1

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

February 5, 2009

Mr. Darryl Buchanan, City Administrator
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

Dear Mr. Buchanan:

SUBJECT: City of Flint Water System

This letter confirms my meeting on January 21, 2009 with Lyle Hippensteel, Mike Brown, Brent Wright, Robert Carlyon, and representatives from Rowe Incorporated. The purpose of the meeting was to discuss the progress that is being made by the city towards addressing the water system deficiencies outlined in the Violation Notice sent to the city on July 7, 2008 and further discussed at a meeting with you at city hall on July 28, 2008.

We received your written response to the Violation Notice on December 22, 2008. Your response which includes a summary prepared by your water department staff and consultant demonstrates that the city has made some progress towards addressing the water system deficiencies. The status of these deficiencies and further actions necessary to correct them is discussed in more detail below.

- Water system contingency plan – Based upon your response and my most recent meeting, a water system contingency plan is being developed that will reflect potential water system emergencies. In addition to addressing typical water related emergencies (power outage, large watermain break, contamination, equipment failure), the plan also needs to address emergencies associated with the 72-inch transmission pipeline and emergency operation of the stand-by water treatment plant (WTP). Finally, enclosed is a water system contingency plan format that was requested Mr. Carlyon.

- Reliability study – Rowe Incorporated has prepared a Scope of Services (SOS) for the reliability study. Based upon our review, the SOS addresses all of the suggested reliability study criteria and is acceptable. We encourage city administration to approve the SOS such that the first phase of the study can be completed by the target date of July 2009.

- Distribution operator training and certification – The city has committed to promote operator training and certification at all levels of distribution certification. We encourage the city to maintain this level of commitment.

- Booster pumping station deficiencies – The Torrey Road pump station project is out to bid and a Notice to Proceed is expected to be granted this spring. The city needs to approve the bids such that construction of the pump station can proceed this year. Next, a cost estimate is being obtained for pump discharge piping modifications at the West Side pump station to address water hammer problems. Again, this improvement at West Side needs to proceed in order to help resolve the issue of frequent main breaks that occur in the surrounding area.

  Next, while we might agree that some uncertainty may exist regarding the future long-term use of pump station No. 4 and Cedar Street pump station; these are critical, important, facilities for today's water supply operations. Additional effort is needed now to ensure adequate reliability of the both pump stations and their respective storage reservoirs, especially during emergency operation. Although we are not opposed to the idea of installing a solar powered mixing system at the Cedar Street reservoir, all options to increase the station's reliability and efficient use of the reservoir need to be investigated.

- Water system valve program – It is our understanding that the Water Service Center has located approximately 80-85 percent of the distribution system valves, and has established a database for hydrants and valves. Approximately 25 percent of the located valves need to be replaced. The city needs to continue working toward establishing an satisfactory valve program. Finally, the status of the distribution system valves and other distribution system appurtenances need to be provided to your consultant as part of the water system reliability study.

- F-1 Operator-in-Charge (OIC) – According to your letter, the city of Flint has retained the services of Robert Carlyon as the F-1certified OIC for the stand-by WTP. Please provide us with a scope of services for this contract. The scope of services should clearly identify the OIC responsibilities in overseeing WTP test runs, emergency operation, on-going operator training, and physical oversight of the stand-by WTP. Finally, the frequency of the OIC attendance or oversight should be detailed.

We appreciate the city's efforts so far to address the water system deficiencies that were listed in the Violation Notice; however, the city must remain committed towards fully correcting the problems with the public water system. Much continued effort and expenditure will be required to bring the water system back into compliance with the Michigan Safe Drinking Water Act.

Next, a method to track the corrective steps of all the water system deficiencies noted in the distribution system sanitary survey and the water treatment plant survey needs to be developed. Based upon our meeting, a spreadsheet that will list specific projects along with a milestone schedule is being developed. This spreadsheet will also update the

preliminary schedule that was provided to us last fall. Please provide us with a copy of the project spreadsheet for our review and comment.

Finally, we will to continue to meet with you and your water department staff on a quarterly basis to review the issues and the efforts concerning the city's water system. If you have any questions regarding this issue or any other water related matter, feel free to call me at the number provided below.

Sincerely,

Michael F. Prysby, P.E., District Engineer
Lansing District Office
Field Operations Section
Water Bureau
517-335-6122

mfp:smb

Enclosure

cc: Mr. Lyle Hippensteel, City of Flint
Mr. Mike Brown, City of Flint
Mr. Brent Wright, Flint Water Plant
Mr. Rick Freeman, P.E., Rowe Incorporated
Mr. Brian McKenzie, Genesee County Health Department

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

August 18, 2008

Mr. Darry Buchanan, City Administrator
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

Dear Mr. Buchanan:

SUBJECT: City of Flint Water System

This letter confirms our meeting on July 28, 2008 with you, Lyle Hippensteel, Mike Brown, Brent Wright, and representatives of Rowe Incorporated. The purpose of the meeting was to discuss the water system deficiencies referenced in Flint's July 7, 2008 Violation Notice. The Violation Notice also included Flint's 2008 Water Distribution System Sanitary Survey.

It was good to hear that you are committed to taking action to address the water system deficiencies that were listed in our agenda for the meeting. We are requesting that you or someone from the staff provide us with a written summary outlining the initial steps that the city will be taking to address these items. It is important that we hear from the city in writing, and especially that you notify us as to meeting the requirement for an F-1 certified operator at the water treatment plant.

Next, the city will need to develop a method to track the many items of not only the distribution system sanitary survey but also the water treatment plant survey. We also need to discuss the many items and come to agreement on a schedule for the city to address them.

Finally, a package of previous correspondence discussing Flint's water system deficiencies was provided to you.

As was also discussed, we believe it would be helpful to meet with you and your water department staff on a quarterly basis to review the issues and the efforts concerning the city's water system. If you have any questions regarding this issue or any other water related matter, feel free to call me at the number provided below.

Sincerely,

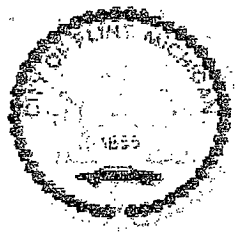
Michael Prysby

Michael F. Prysby, P.E., District Engineer
Lansing District Office
Field Operations Section
Water Bureau
517-335-6122

mfp:smb

cc: Mr. Lyle Hippensteel, City of Flint
Mr. Mike Brown, City of Flint
Mr. Brent Wright, Flint Water Plant
Mr. Rick Freeman, P.E., Rowe Incorporated
Mr. Brian McKenzie, Genesee County Health Department

CORR file - yes





Donald J. Williamson
Mayor

July 16, 2008

Jeffrey Wright
Drain Commissioner

#2310
#2615

Anthony Adams
Deputy Mayor
City of Detroit
Water and Sewerage Department
735 Randolph Street, Room 506
Detroit, MI 48226-2830

Dear Mr. Adams:

This letter is a follow-up to the County of Genesee's letter to the Department on June 3, and Mr. Mercado's response of June 12, 2008.

The City of Flint in concert with Genesee County is requesting to begin the process for a new water contract with the City of Detroit. It is our expectation that we will explore all options for water supply between the communities. The following is a list of items we wish to cover:

1. New contract with options to have a mutual aid agreement.
2. Option to purchase pipeline from Imlay City to Genesee County.
3. Option to purchase raw water from Port Huron.
4. Option to purchase capacity in the Detroit system.

As you know, our biggest hurdle to a renewed agreement is the distance and elevation multiplier that is applied in the rate model. We believe the multiplier as applied does not reflect a true cost of service and, therefore, increases our costs significantly higher than the benefit received.

As we are working in concert with Genesee County and since they have been working with your Department over the last two years on this issue, we have no objections to you continuing this process through their office. I have confidence that they will work in the best interest of all county residents including the City. Therefore, please schedule a meeting through the County.

Sincerely,

Donald J. Williamson
Mayor
City of Flint

Jeffrey Wright
Genesee County Drain Commissioner

JENNIFER M. GRANHOLM
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

STEVEN E. CHESTER
DIRECTOR

July 7, 2008

CERTIFIED MAIL

VIOLATION NOTICE

Mr. Daryl Buchanan, City Administrator
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

WSSN: 2310

Dear Mr. Buchanan:

SUBJECT: City of Flint Water System
2008 Water Distribution System Sanitary Survey Update

This letter confirms my visits on April 11, 2008, April 15, 2008, and April 22, 2008 with Michael Brown, Brent Wright, and Glen Thomas. The purpose of the visits was to update the City of Flint (City) 2006 Water Distribution System Sanitary Survey.

In accordance with Section 15 (1) of the Michigan Safe Drinking Water Act, Act 399, P.A. 1976, as amended (Act 399) and the rules promulgated pursuant to Act 399, the City is hereby notified of the need to make water system improvements. Section 15 (1) states: "When considered necessary for protection of the public health, the department shall notify a supplier of water of the need to make changes in operations, to provide treatment, to make structural changes in existing systems, or to add additional capacity as necessary to produce and distribute an adequate quantity of water meeting the state drinking water standards."

Since the 2006 survey, the City has failed to make adequate progress in addressing critical water system improvements. The City is hereby notified to correct the following water system violations.

1. Prepare a water system contingency plan that includes a protocol for placing the stand-by water treatment plant (WTP) into emergency operation.

2. Retain a consultant to perform a water system reliability study. Develop a capital improvements program based upon transmission and distribution system needs revealed in the reliability study and implement asset management principles.

3. Improve distribution system operation and maintenance.

   A. Promote operator certification and training for distribution system operators.

B. Address booster pumping station deficiencies and prepare a schedule.

C. Develop and implement a water system valve program.

Given the number of water system deficiencies that remain un-resolved, the City's water distribution system has declined to a **"Deficient"** rating. Until significant progress is made, the distribution system rating will not improve. Also, for a more thorough discussion of the City's updated survey, please reference the Conclusions and Recommendations section of the 2008 Water Distribution System Sanitary Survey.

Finally, Mr. Robert Misekow is no longer with the City. This leaves the City of Flint without an F-1 certified operator-in-charge (OIC) to oversee operation and maintenance activities at the stand-by WTP as required in Administrative Rule 325.11905 (1), of the Michigan Safe Drinking Water Act (Act 399).

Since no other WTP operators have obtained the F-1 license, the City will need to retain another OIC holding an F-1 license. As a minimum, the OIC needs to maintain an active role in various WTP operations listed below:

- WTP test runs
- Emergency operation
- Continuing education and operator training

We would like to meet with the City to discuss the development of a schedule that addresses the items from the survey and the requirement to obtain an F-1 certified operator. Please contact me at your earliest convenience to arrange a meeting.

If you have any questions regarding these issues or any other water related matter, please feel free to call me at the number listed below.

Sincerely,

Michael F. Prysby, P.E., District Engineer
Water Bureau
Field Operations Section
517-335-6122

mfp:smb

cc: Mr. Michael Brown, City of Flint
Mr. Brent Wright, City of Flint
Mr. Brian McKenzie, Genesee County Health Department

File # 2310

DEPARTMENT OF UTILITIES
Water Plant & Facilities

Department of Utilities
FLINT WATER PLANT

Donald J. Williamson
Mayor

Brent Wright
Water Plant Supervisor

To: Mike Prysby PE.
District Engineer MDEQ

February 27, 2008

From: Brent Wright
Water Plant Supervisor

Subject: Plant effluent to 3mg well

Mike per are conversation the 48" gate valve from plant effluent to the 3mg well is damaged and inoperable. The city has hired Rowe Engineering to redesign the piping through the clear well under the office area at the plant. This clear well in the past was used for backwash water. The well is not needed any more so the piping from the filters to the effluent line will be connected and bypassing the clear well. The design and cost should be in my office the week of march 3rd. I will keep you up to date as the project moves forward.

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

January 4, 2008

Mr. Robert Misekow, Utilities Director
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

Dear Mr. Misekow:

SUBJECT: 72-inch Transmission Main Emergency

This letter confirms completion of an emergency repair of the 72-inch transmission main in December of 2007. The emergency repair began on December 18, 2007. The repair involved complete replacement of two 20-foot sections of transmission piping due to a significant leak in the pipe joint. Emergency procedures were concluded on December 23, 2006 following completion of the repair and confirmation of no bacteriological contamination within the Flint water distribution system.

We would like to commend the city of Flint for their role in coordinating the remedial activities that minimized interruption in water service. The effort put forth minimized potential impacts to water quality and played a key role in protecting the public health of residents of Flint.

As we discussed, the city will need to file a written report (90-day report) with our office detailing the discovery, cause, remedial measures taken to meet the emergency, and the procedures by which customers were notified. The report also needs to outline the extent of the emergency, its duration, and alternate sources of water supplied during the emergency. The shutdown of the 72-inch transmission main was a real-time event that helped to determine the ability of the city to execute emergency procedures as a means to maintain adequate water service. The report should be prepared in a manner such that it can be used as a reference to assist the city in the event of a similar emergency in the future. Please provide our office with a copy of the 90-day report by no later than April 15, 2008.

Finally, Flint's stand-by water treatment plant was unable to provide an emergency supply of water to the city due an inoperable valve in the plant discharge piping between the treatment plant and Pump Station 4. This valve must be repaired or replaced as soon as possible. Please confirm with us, in writing, as to how this problem will be corrected by no later than January 21, 2008. We would also like to discuss additional chlorination capabilities at the water treatment plant.

If you have any questions regarding this issue or any other water related matter, feel free to call me at the number provided below.

Sincerely,

Michael F. Prysby, P.E., District Engineer
Lansing District Office
Field Operations Section
Water Bureau
517-335-6122

mfp:smb

cc: Mr. Brent Wright, Flint Water Plant
Mr. Brian McKenzie, Genesee County Health Department

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

July 16, 2007

Mr. Robert Misekow, Utilities Director
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

Dear Mr. Misekow:

SUBJECT: City of Flint, Water Treatment Plant

This letter confirms my visit with Mr. Brent Wright and you on July 3, 2007, at the Flint Water Treatment Plant (WTP). The purpose of the visit was to discuss security provisions on plant grounds, preparing a WTP test-run protocol, and reviewing process monitoring during the treatment plant test-runs. The status of the 72-inch transmission main leak was also discussed. Finally, additional information needed in order to complete the WTP Sanitary Survey and the 2007 Needs Survey was discussed. These items are discussed in more detail below.

The recent fire at WTP No. 1 caused by repeated vandalism raises the issue of security provisions on plant grounds. In spite of a security fence surrounding the WTP site, vandals have been able to gain access to plant grounds. The ability of vandals to gain access to plant grounds increases the vulnerability of WTP No. 2, Pump Station No. 4, Control Station No. 2, and other vital water system structures. Additional security measures including installation of motion sensors and/or intrusion alarms at Pump Station No. 4 and Control Station No. 2 appear necessary in order to enhance security at these locations.

The possibility of razing WTP No. 1 was also discussed as a means to reduce vandalism at this location. We concur with the idea of razing WTP No. 1 since the structure, in its current condition, has been an attraction for vandals. Finally, security cameras have been purchased for the dams along the Flint River and both ground storage reservoirs; however, the cameras are not connected to the WTP's Supervisory Control and Data Acquisition system and are not operational. These security cameras need to be placed into operation.

Next, the next WTP test-run has been scheduled for the week of July 16, 2007. We have also received a WTP test-run proposal that outlines the proposed operation. The proposal was reviewed and our comments were sent to you and Mr. Wright on July 11, 2007. A copy of our comments is also enclosed with this letter.

Next, process monitoring was reviewed. As we discussed, ozone residuals need to be monitored at all three monitoring points along the ozone contactor basin in order to

determine the amount of concentration x time (CT) credit achieved during ozone treatment. Next, chlorine demand and breakpoint chlorination tests need to continue such that additional operating nomographs representing chlorine dosages for varying operating conditions can be prepared. It is vitally important that sufficient CT be achieved in order to ensure that water being sent to the distribution system meets the surface water treatment requirements. Finally, staff needs to continue performing jar tests to determine coagulant feed rates under different operating conditions. Operating nomographs should also be prepared for the other chemical feed applications.

Next, the utilities department has placed a purchase order with a contractor for investigation and possible repair of another leak occurring from the 72-inch transmission main. The leak is located in the vicinity of the Potter and Gale Road intersection. It appears that the investigation and any necessary repair will be delayed until this fall after water usage decreases. We are in concurrence with delaying this work until this coming fall.

Finally, additional information pertaining to the WTP Sanitary Survey and the 2007 Infrastructure Needs Survey has been completed and sent to our office. This information will be used towards finalizing each of these documents.

If you have any questions regarding this issue or any other water related matter, feel free to call me at the number provided below.

Sincerely,

Michael Prysby

Michael F. Prysby, P.E., District Engineer
Lansing District Office
Field Operations Section
Water Bureau, 517-335-6122

Enclosure

cc: Mr. Brent Wright, Flint Water Plant

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

June 8, 2007

Certified Mail

Ms Peggy Cook, City Administrator
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

NOTICE LETTER
WSSN: 2310

Dear Ms. Cook:

SUBJECT: Stand-by Water Treatment Plant (WTP), Ozone Facility

It has recently been brought to our attention that the Flint stand-by Water Treatment Plant (WTP) no longer has full operating capability. Specifically, the WTP ozone treatment process is not in service due to a computer software problem that is preventing the ozone generators from functioning. The software problem was first identified in March 2007, but for whatever reason, has not been corrected.

Section 325.1015 (2) of the Michigan Safe Drinking Water Act, Act 399. PA 1976 states; *"If upon inspection the department determines that the waterworks system to be inadequate or so operated as to not adequately protect the public health, the department may order the supplier of water to make alterations in the waterworks system or its method of operation as may be required or considered advisable by the department to assure the public supply is adequate, healthful, and in conformance with state drinking water standards."*

The purpose of this letter is to notify the City of Flint of the inability for their stand-by WTP to operate as designed as an emergency stand-by facility due to the lack of ozonation. The loss of ozone as a pretreatment step compromises the WTP's ability to provide potable drinking water in the event of an outage from Detroit. This situation further prohibits the staff of the WTP from conducting comprehensive test-runs to allow operators to effectively operate the plant and produce water meeting the state drinking water standards.

The city is directed to correct the ozone equipment problem as soon as possible.

If you have any questions regarding these issues or any other drinking water related matter, please feel free to call me at the number listed below.

Sincerely,

Michael F. Prysby, P.E., District Engineer
Field Operations Section
Water Bureau
517-335-6122

cc: Mr. Robert Misekow, Director of Public Works
Mr. Brent Wright, City of Flint
Mr. Mike Brown, City of Flint
Ms. Inez Brown, Clerk, City of Flint
Mr. Brian McKenzie, Genesee County Health Department

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

March 22, 2007

Ms Peggy Cook, City Administrator
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

WSSN: 2310

Dear Ms. Cook:

SUBJECT: Water System Reliability
City of Flint – Genesee County

Over the last few years staff of the Michigan Department of Environmental Quality (DEQ) has had several discussions and correspondence with various officials of both the City of Flint (City) and Genesee County (County) regarding water system reliability. The primary issue is the inability to readily supply water from the City's newly rehabilitated water treatment plant to the County's water system.

In April of 1998, the City submitted a Project Plan to the DEQ requesting consideration under the Drinking Water Revolving Fund (DWRF) program for funding to rehabilitate the City's existing standby water treatment plant (WTP). The Project Plan makes several statements indicating that rehabilitation of the WTP was necessary in order to provide a reliable second source of potable water for Flint and Genesee County.

The Summary of Project Need contained within the Project Plan contains the following statement: "Substantial plant upgrades are necessary to meet long-term reliability and water quality requirements as per U.S. EPA and MDEQ Safe Drinking Water Standards. A reliable second source of water continues to be a grave concern to the City of Flint, Genesee County and the Michigan Department of Environmental Quality (MDEQ)."

The Project Background section also states: "Based on our evaluation we conclude that the existing Flint water treatment plant should be rehabilitated to a Phase I firm capacity of 36 MGD, treating Flint River water for an extended period of time (months if needed) to provide the uninterruptible water supply as a reliable back-up to meet the Flint City water needs when the DWSD single pipeline to Flint City/Genesee County fails."

Finally, the City's cover letter that accompanied the Project Plan, signed by then City Administrator David Ready, states: "We are committed to providing the appropriate reliability incumbent upon all water supply utilities should the single transmission main

from DWSD fail." Approval for funding through the DWRF program was granted to Flint based upon the project need and with the understanding that reliability would also be provided to Genesee County. The rehabilitation project was complete as of June 2006.

As far back as September 2004, Genesee County sought to formalize the standby service arrangements, and they proposed a water supply mutual aid agreement. Furthermore, since that time, Genesee County has made several additional requests to meet and negotiate emergency water service from the City with no response. Enclosed is a chronology of the overtures by the County regarding stand-by water service.

Based on this information, the City of Flint has not met a major component of their DWRF Project Plan, and they have reneged on their commitment to provide the appropriate water system reliability.

Water utility officials from both the City and the County have concluded that additional infrastructure (a booster station and some transmission main) is likely needed to readily provide water to the County system. The County has made numerous good faith efforts to begin discussions on how to address these needs plus develop a contract for service. It is time for the City to sit down with the County and move forward on this important public health issue.

Failure to address this reliability issue, and meet the objectives of your original Project Plan may jeopardize approval of any future DWRF proposals.

If you have any questions regarding these issues or any other water related matter, please contact me immediately.

Sincerely,



Michael F. Prysby, P.E., District Engineer
Field Operations Section
Water Bureau
517-335-6122

mfp:smb

Enclosure

cc: Ms. Inez Brown, Clerk, City of Flint
Mr. Robert Misekow, Director of Public Works
Mr. Brian McKenzie, Genesee County Health Department
Mr. Jim Cleland, DEQ
Mr. Clifford Heckathorn, DEQ

Negotiations for Stand-by Water Source Flint – Genesee County Chronology

Prepared by: Michael F. Prysby, P.E.
March 21, 2007

9/14/04 - Genesee County proposes an Emergency Water Supply Mutual Aid Agreement that contains the following: provisions for an emergency interconnect, a commitment to cover construction costs, and emergency use provisions.

3/30/05 - Genesee County sends a letter to Flint expressing their interest to meet and negotiate stand-by water service.

8/18/05 - Genesee County updates the MDEQ on the progress of various options for stand-by water service. The county states that stand-by water service from Flint is the most desirable option however, there has been no progress towards reaching any type of agreement.

8/31/05 - Genesee County sends a letter to Flint with a stronger emphasis regarding repeated efforts to meet with the city to negotiate stand-by water service. The city is encouraged to open the door for negotiations otherwise the county will have no choice but to pursue other stand-by water service options as required by the MDEQ.

12/9/05 - Genesee County staff meet with interim water treatment plant operator Bill Daniels to discuss building an improved working relationship between Genesee County and Flint. Genesee County also proposes a team approach to assist Flint operators in operating the WTP during an emergency. Genesee County proposes a draft Temporary Operating Agreement in a 12/12/05 follow-up letter.

2/7/06 - Genesee County resends the Temporary Operating Agreement to the city of Flint. Flint's lack of response towards discussing the draft document is also acknowledged in the cover letter.

2/14/06 - MDEQ's comments are sent to Flint regarding the Genesee County's draft Temporary Operating Agreement. The

MDEQ also requested an update on the status of the draft agreement.

9/19/06 - In the wake of the 72-inch transmission main emergency, Genesee County sends another letter to the city of Flint expressing the interest and need to obtain stand-by water service. The letter also enclosed previous letters sent to Flint from Genesee County on this matter.

MDEQ note – according to our records, we have not received any information or feedback from the city of Flint regarding their intentions to negotiate stand-by water service to Genesee County. Also, based upon the information received from Genesee County, the city of Flint has not made an official response to Genesee County on any of their requests to meet and negotiate stand-by water service.

MEP Flint file

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

January 30, 2007

Mr. Joe Conroy, Governmental Relations Director
City of Flint
Department of Utilities
1101 South Saginaw
Flint, Michigan 48502

Dear Mr. Conroy:

SUBJECT: Flint Water Treatment Plant (WTP)

We have reviewed your letter of January 5, 2007, informing us of the near completion of the rehabilitation plan for the WTP agreed to by the city of Flint (City) and the Department of Environmental Quality (DEQ) in August of 1999, and as amended in May of 2003.

In your letter, you also inquire as to our support for a project to finish the necessary upgrades to the WTP to allow for continuous operation beyond the plant's present status as an emergency or standby facility. As we discussed in our phone conversation, it is not the DEQ's position to support a proposal or project, but to ensure that the appropriate environmental and public health regulations are complied with and any required permits are obtained.

There are several very important considerations that must be adequately addressed for DEQ to approve the continuous use of the Flint River as the City's source for public water supply, and to issue construction permit(s) for additional WTP equipment and facilities. The major issues are as follows:

- The City will need to submit a complete description of the Flint River as source of supply. Specifically, hydrological data, safe yield, description of the watershed with a discussion of the sources of potential contamination, and a summary of raw water quality. Ultimately a source water protection plan will also need to be prepared.

  It is acknowledged that the City previously used the Flint River as a source; however, switching from purchased water from Detroit is a step back in source water quality. The City will need to address the perception of lower water quality directly if it expects the water customers and citizens to support the project.

date negotiations between the City and the County have not resulted in an agreement for standby service. In addition, there is also some infrastructure (pump station and transmission piping) needed for the WTP to be able to serve the County. These issues need to be addressed as soon as possible so the County also has an emergency source of drinking water.

It should also be noted that a project plan for phase two of the WTP rehabilitation will need to be a comprehensive planning document. Restoring the WTP to continuous service is a significant undertaking and an environmental impact study or at least an assessment may be required as part of a project plan

- Other impacts. A return to continuous service of the WTP will mean contractual issues with Detroit Water and Sewerage Department (DWSD). In addition, as the supplier of Detroit water to Genesee County there are also contractual or political issues there as well. Would Genesee County continue to receive Detroit water from the City or would the County become a direct customer of DWSD? Would DWSD become an emergency source for the City? These issues and questions should be addressed as the part of the City's evaluation of returning the WTP to continuous service.

If the City decides to move ahead with the phase two project, it will be critical for the City and the DEQ to communicate well. Please contact me when you have additional questions. If you have specific Drinking Water Revolving Fund program questions, I would recommend that you call Mr. Clifford Heckathorn directly at 517-373-4725.

Sincerely,



Timothy A. Benton, P.E.
Lansing District Supervisor
Field Operations Division
DEQ - Water Bureau
517-335-4523

cc: James Cleland, DEQ
Clifford Heckathorn, DEQ
Michael Prysby, DEQ

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

January 22, 2007

Mr. Joe Conroy, Governmental Relations Director
City of Flint
Department of Utilities
1101 South Saginaw
Flint, Michigan 48502

Dear Mr. Conroy:

SUBJECT: Flint Water Treatment Plant (WTP)

We have reviewed your letter of January 5, 2007, informing us of the near completion of the rehabilitation plan for the WTP agreed to by the city of Flint (City) and the Department of Environmental Quality (DEQ) in August of 1999, and as amended in May of 2003.

In your letter, you also inquire as to our support for a project to finish the necessary upgrades to the WTP to allow for continuous operation beyond the plant's present status as an emergency or standby facility. As we discussed in our phone conversation, it is not the DEQ's position to support a proposal or project, but to ensure that the appropriate environmental and public health regulations are complied with and any required permits are obtained.

There are several very important considerations that must be adequately addressed for DEQ to approve the continuous use of the Flint River as the City's source for public water supply, and to issue construction permit(s) for additional WTP equipment and facilities. The major issues are as follows:

- The City will need to submit a complete description of the Flint River as source of supply. Specifically, hydrological data, safe yield, description of the watershed with a discussion of the sources of potential contamination, and a summary of raw water quality. Ultimately a source water protection plan will also need to be prepared.

  It is acknowledged that the City previously used the Flint River as a source; however, switching from purchased water from Detroit is a step back in source water quality. The City will need to address the perception of lower water quality directly if it expects the water customers and citizens to support the project.

- Hamilton Dam. The issues regarding this dam have been discussed for a couple years. However, the importance of the dam to WTP operations has yet to be quantified. The dam creates pool depth at the WTP to allow for proper raw water pump operation but the exact operating conditions at the dam and the impact on WTP operations have not been determined. If the dam needs to be removed and replaced, significant costs will be incurred.

  It should also be noted that the dam would not be eligible for funding under the Drinking Water Revolving Fund (DWRF). The DWRF was the funding mechanism for the original rehabilitation plan for the WTP.

- Sludge disposal. If the WTP is returned to continuous operation, provisions for dealing with the residuals of water treatment will need to be addressed. Specifically, ferric sludge from clarification processes, and lime sludge from softening will need to be disposed of properly.

  The two disposal options that have been discussed are: 1) filter press and landfilling or land application, and 2) re-use of the Bray Road Sludge Lagoon. Filter presses are routinely used for this type of waste, but the equipment is fairly expensive and two units would be needed to provide adequate reliability.

  Re-use of the old sludge lagoon poses a number of questions and/or problems. The facility does not meet today's standards for this type of storage facility. In addition, there may have been impacts from previous activities on the groundwater in the vicinity of the lagoon. Therefore, a comprehensive hydro-geological investigation into the site to determine whether groundwater contamination has occurred is needed. If the City wishes to pursue re-use, a complete proposal would need to be submitted that would resolve any contamination that may have occurred, address the fate of the existing solids at the lagoon, and propose a design of any new sludge storage structures including perhaps a surface water or groundwater discharge permit application.

- Drinking Water Revolving Fund. If the City is planning to use this low interest loan program for financing the second phase of WTP rehabilitation, there are a couple of items that need to be addressed. First, the contract for the first phase should be closed out. There are contract issues that should be completed as soon as possible.

  Second, the project to restore the WTP as a standby facility was originally proposed to be able to supply Genesee County Division of Water and Waste Services (County) with a back-up source of drinking water as well. However, to date negotiations between the City and the County have not resulted in an agreement for standby service. In addition, there is also some infrastructure (pump station and transmission piping) needed for the WTP to be able to serve the County. These issues need to be addressed as soon as possible so the County also has an emergency source of drinking water.

It should also be noted that a project plan for phase two of the WTP rehabilitation will need to be a comprehensive planning document. Restoring the WTP to continuous service is a significant undertaking and an environmental impact study or at least an assessment may be required as part of a project plan

If the City decides to move ahead with the phase two project, it will be critical for the City and the DEQ to communicate well. Please contact me when you have additional questions. If you have specific Drinking Water Revolving Fund program questions, I would recommend that you call Mr. Clifford Heckathorn directly at 517-373-4725.

Sincerely,

Timothy A. Benton, P.E.
Lansing District Supervisor
Field Operations Division
DEQ - Water Bureau
517-335-4523

cc: James Cleland, DEQ
Clifford Heckathorn, DEQ
Michael Prysby, DEQ

— High Service Pumping Improvements needed
needed Condition & Availability of pumps limit → Total cap 46 MGD
Firm cap 26 MGD

— Op cart.
* PLAN to op/staff WTP @ most levels
— when to either hire on FT/ WTP sup.
* change our policy relative to existing WTP operators while FT Based on const. of phase II & , test runs, new equip. shakedowns, antic start-up of permanent op. of WTP

Cork file - yes

CITY OF FLINT
DEPARTMENT OF UTILITIES

MFP/FYI

Donald J. Williamson
Mayor

January 5, 2007

Timothy Benton, P.E.
Dept. of Environmental Quality
Lansing District Supervisor
Field Operations Division
Constitution Hall
525 W. Allegan Street
PO Box 30242
Lansing, MI. 48909

Dear Mr. Benton:

As you know, the City of Flint is nearly complete with its Phase I, Segment IV of the Water Plant rehabilitation plan as agreed upon with the State of Michigan, DEQ in August, 1999.

While the current Water Plant and Facilities can produce water for the short-term duration on a test run basis it is our desire to produce clean, safe water on an on-going basis, if needed. It would be appropriate for the City of Flint to complete the Water Plant rehabilitation to allow the City to be able to produce the projected capacity of 36 million gallons per day in the future. This would allow us more options for the City to decide how they will proceed in the future.

Please confirm your support for the final rehabilitation of the Flint Water Plant to us. (X)

Sincerely,

Joe Conroy

Joe Conroy, Governmental Relations Director

CITY OF FLINT

Donald J. Williamson
Mayor

RECEIVED
DEC 22 2006
MDEQ-Water Division
Lansing District Office

December 19, 2006

Mike Presby
District Engineer
Constitution Hall
525 W. Allegan Street
Post Office Box 30242
Lansing, MI 48909-7742

Re: Sanitary Survey Update 2006
DEQ Letter April 14, 2006
Conclusions and Recommendations Response

Dear Mr. Presby:

Water System Viability. The present supervisor holds an S-1 Certificate.

Water Distribution. The program for operator certification remains the same as before.

Water Treatment Plant. Robert Misekow has F-1 Certification. We have encouraged both Brent Wright and Mike Glasgow to write for operator certification this coming year. It is difficult for plant employees to obtain the necessary experience points to qualify for higher certification. It is my belief that restrictions applied to backup waterplants should be relaxed. Our laboratory director, Michael Glasgow, is an ideal candidate for a plant supervisory position, but is hindered by minimal points awarded for four (4) weeks per year of plant experience.

As you are aware Mr. William Daniels has been reassigned to Maintenance Supervisor. I'm unsure if Mr. Brent Wright possesses all of the qualifications required to take the F-1 exam this coming year.

Utilities/Cross Connection Division. Mr. Glen Thomas remains in responsible control of the Cross Control Program. He has submitted his 2005 annual report.

System Storage. Discussions on conditions of the facilities have been held. Scheduling inspections will be addressed Spring of 2007.

Elevated Tank. A requisition was submitted just recently for inspection of the tank.

Pumping Stations. The supervisor at the Water Treatment Plant was told this week to write a requisition for replacement of electrical switchgear and controls at the Cedar Street Station.

Transmission Distribution.

- Pierson Road – two (2) miles of transmission main from Highway 475 west.
- Third Avenue plans are complete. From Third Avenue to Saginaw Street, water mains 4" to 24", ductile iron, estimated at $4,116,000.00 to be completed by October 31, 2007.

Valve Program. Supervisor making plans for upcoming year.

Contingency Plan. This plan is covered in the previously submitted 90 day report on the 72" Transmission Main break.

Closing. We will respond to the conclusions and recommendations in your earlier letter after reviewing same.

Although we have not addressed all of the items in your Report Summary, it is our opinion that substantial progress has been achieved. All of our supervisors have been made aware of these deficiencies and the next report should see more improvement.

Sincerely,

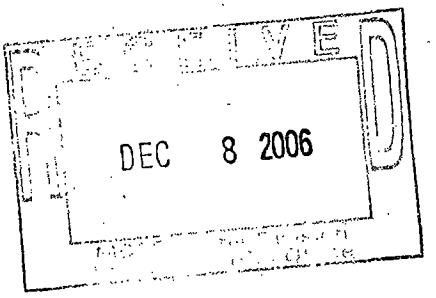
Robert Misekow

Robert Misekow
Utilities Director

C: Mayor Donald J. Williamson
Peggy Cook, City Administrator

Donald J. Williamson
Mayor

CITY OF FLINT



#2310

December 6, 2006

Timothy Benton
District Supervisor
Constitution Hall
525 W. Allegan Street
Post Office Box 30242
Lansing, MI 48909-7742

Re: Fire Hydrant Program

Dear Mr. Benton:

As of this week, the Water Service Center has serviced 5,200 fire hydrants. This included flow and drainage checks.

Thirty five are out of service. We expect these to be finished at the end of the month, if line breaks, etc. are not excessive.

We know that the Hydrant Program was high on your list of items to be completed by the City. Our Water Service Center has succeeded in accomplishing a major task, our next job will focus on water distribution valves.

Sincerely,

Robert Misekow

Robert Misekow
Utilities Director

C: Mayor Donald J. Williamson
Peggy Cook, City Administrator
Mike Brown, Superintendent, Water Service Center

File # 2310 MFP

Peggy Cook
City Administrator

Donald J. Williamson
Mayor

RECEIVED
NOV 16 2006

MEMORANDUM

#2310

TO: Mr. Timothy Benton, District Supervisor
MDEQ

FROM: Robert Misekow
Utilities Director

DATE: November 8, 2006

SUBJECT: Genesee County's 60" Sanitary Sewer Crossing(s)
The City's Water 72" at Kearsley Golf Course Concerns

There appears to be some concern amongst the engineers here that tunneling under the 72" Detroit Water line places us in a compromising position. Perhaps the memory of the City's 72" water transmission repair in August is still fresh in our minds.

It is in the interest of the owner, the county and of course the state, that all possible problems that may be encountered on this job be examined by all parties and that job commencement not be initiated until this is done. We believe that such an integral approach is the responsibility of the county, the state and any contractors that might be involved.

A meeting(s) of all concerned, prior to commencing this project, to discuss mutual concerns relating to maintaining the integrity of the 72" is dictated.

I would like to hear of your experiences in like situations.

Thank you.

Robert Misekow
Utilities Director

cc: Donald J. Williamson, Mayor
Peggy Cook, City Administrator
Deirdre Pitts, Human Resources Director

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

September 19, 2006

Mr. Robert Misekow, Utilities Director
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

Mr. John O'Brien, Director
Genesee County Drain Commissioner
G-4610 Beecher Road
Flint, Michigan 48532

Dear Mr. Misekow & Mr. O'Brien:

SUBJECT: 72-inch Transmission Main Emergency

This letter confirms our meeting on September 7, 2006 at the Flint Water Treatment Plant. Mr. Timothy Benton from our office also attended the meeting. The purpose of the meeting was to discuss the events that occurred during the 72-inch transmission main emergency. The emergency began on August 12, 2006 upon discovery of a leaking valve just west of M-15. The emergency concluded on August 24, 2006 following completion of the repair and confirmation of no bacteriological contamination within the Flint or Genesee County Water service area.

We would like to commend both the city of Flint and Genesee County for their roles in coordinating the remedial activities that minimized interruption in water service. The effort put forth minimized potential impacts to water quality and played a key role in protecting the public health of residents of Flint and Genesee County.

As we discussed, both utilities will need to file a written report (90-day report) with our office detailing the discovery, cause, remedial measures taken to meet the emergency, and the procedures by which customers were notified. The report also needs to outline the extent of the emergency, its duration, and alternate sources of water supplied during the emergency. The shutdown of the 72-inch transmission main was a real-time event that helped to determine the ability of the city and the county to execute emergency procedures as a means to maintain adequate water service. The report should be prepared in a manner such that it can be used as a reference to assist both utilities in the event of a similar emergency in the future. Please provide our office with a copy of the 90-day report by no later than December 15, 2006.

Finally, it would be worthwhile for both utilities to review and update their water system contingency plans relative to mitigating a 72-inch transmission main emergency. Several scenarios were discussed during our meeting and were included in the outline provided at the meeting. Each utility's role, remedial actions, etc. as outlined in the 90-day report can be incorporated into preparing a contingency plan for each type of transmission main emergency.

If you have any questions regarding this issue or any other water related matter, feel free to call me at the number provided below.

Sincerely,

Michael F. Prysby, P.E., District Engineer
Lansing District Office
Field Operations Section
Water Bureau
517-335-6122

mfp:smb

cc: Mr. Brent Wright, Flint Water Plant
Mr. Dave Jansen, Genesee County Drain Commissioner
Mr. Brian McKenzie, Genesee County Health Department

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

April 14, 2006

Ms. Peggy Cook, City Administrator
City of Flint Water Plant
4500 North Dort Highway
Flint, Michigan 48505

WSSN: 2310

Dear Ms. Cook:

SUBJECT: City of Flint Water System
2006 Sanitary Survey Update

This letter confirms my visits on February 23, 2006 and March 3, 2006 with Bill Daniels, and Michael Brown. The purpose of the visit was to update the city's water system 2004 Sanitary Survey.

The city has addressed certain water-related concerns including; cross connection control and completion of Phase I of the water treatment rehabilitation project. Additional administrative steps are being taken which should set the stage for transmission/distribution system and pumping station improvements during 2006 and 2007.

However, there remain many water system deficiencies of varying concern that have not been adequately addressed, thus, the City of Flint's water distribution system continues to be rated **"Marginal"**. Until significant progress in the major areas (summarized below) is made, the distribution system rating will not improve.

1. Obtain an F-1 certified operator for the water treatment plant and continue to promote operator certification and training for distribution system operators.

2. Develop and implement a water system valve program.

3. Revise the water system Contingency Plan that includes a protocol for placing the treatment plant into emergency operation.

4. Address booster pumping station deficiencies and prepare a schedule.

5. Develop a capital improvements program that addresses both transmission and distribution system needs.

For a more thorough discussion of our updated survey, please reference the attached Conclusions and Recommendations document.

If you have any questions regarding these issues or any other water related matter, please feel free to call me at the number listed below.

Sincerely,

Michael F. Prysby, P.E., District Engineer
Water Bureau
Field Operations Section
517-335-6122

mfp:smb

cc: Mr. Bill Daniels, City of Flint
Mr. Glenn Thomas, City of Flint
Nr. Michael Brown, City of Flint
Mr. Brian McKenzie, Genesee County Health Department

WATER SYSTEM REVIEW

GENERAL

Basic Information

WSSN:	2310	Supply:	City of Flint	County:	Genesee
Date:	2/23/2006	Reviewed by:	MFP	District:	11

Primary Contact:	Michael Brown	Copy To:	William Daniels	Glen Thomas
Title:	Water Distribution Supv	Title:	WTP Supervisor	Inspector
Telephone:	810-766-7359	Telephone:	810-787-6537	810-787-6537
Cell Phone:		Cell Phone:		
Pager:		Pager:		
Fax:		Fax:		
e-mail:		e-mail:		
Address:	Flint Water Service Ctr	Address:	Flint Water Plant	Utilities/Cross
	3310 East Court St		4500 N. Dort Hwy	Connection Division
	Flint, MI 48506		Flint, MI 48505	5400 N. Dort Hwy

Population:	124943	Year	2000	Basis:	2000 Census

Operator Certification

Distribution Classificati S1

Operator in Charge:	Michael Brown	Cert.:	S1, F3, ABC Wastewater
Other Operators:	Lyle Waddell		S2
	Howard Swickard		S2
	Jeff Church		S3
	Mark Pavwoski		S3
	Steve Spooner		Expecting
	Paul Simpson		Expecting

Treatment Capacity: _____

Treatment Classification: F1

Operator in Charge:	William Daniels	Cert.	F3/S3
Other Operators:	B. Wright		F3/S3
	C. Koryciak		F4
	R. Duby		F4
	C. Yanta		F3
	T. Brattton		F4
	M. McFarland		F4
	T. Childs		F4
	M. Glasgow		F4/C&D Wastewater
	N. Alexander		F4
	S. Dungee		S4
	J. Kapp		S4
	M. Beckley		S4
	M. Beckelic		Watewater D

Operator Comments

The City of Flint water distribution system is operated and maintained by the Utilities Department. The Utilities dept is broken down into five operating divisions or cost centers out of which three play a key role in operating and maintaining the water distribution system. These divisions are; The Water Service Center, the Water Treatment Plant and the Utilities/Cross Connection Division. Appendix A illustrates the structure and the Utilities Dept and the various cost centers.

The Water Service Center (WSC) is broken down into two divisions, Water Distribution Division (WDD) and Sewer Maintenance Division. The WDD supervised by Michael Brown is responsible for operating and maintaining the water distribution system piping, hydrants, and valves. The WDD also conducts meter reads, replaces meters and maintains distribution system records and maps. This division is broken down into two main branches. One branch focuses primarily on water main operation and maintenance while the other branch is dedicated to meters.

Both branches have numerous operators at various levels of employee responsibility. Appendix B shows and employee organizational chart for the WDD and the certification status among the employees. The water distribution supervisor and the water distribution foreman positions are required to have S1 and S2 licenses respectively. Operator certification, however, is not required nor promoted for the employees assigned to the positions below the distribution foreman level. Several operators at the distribution maintainer level (level 18 maintainer) have acquired the S4 license, however, they were unable to maintain the continuing education credits thus their licenses have fallen to an inactive status. New regulations will eventually require the WDD to have at least two S1 operators.

The water treatment plant (WTP) staff, supervised by William Daniels, operates and maintains Flint's stand-by water plant. Appendix C illustrates the employee organizational chart at the WTP. WTP staff play an important role in distribution system activities and include; operation and maintenance of the city's distribution system pumping stations, storage facilities, and points of connection to other supplies. WTP staff also maintains some of the key programs including both the bacteriological and lead and copper monitoring programs. Finally, WTP staff are responsible for monthly operating reporting, contingency planning and public relations (receipt of customer complaints).

Next, the Utilities/Cross Connection Division, also supervised by William Daniels, is responsible for implementing the City of Flint Cross Connection Control Program. The division has one employee, Glen Thomas who is responsible for conducting the routine inspections and maintaining records. A second employee, Yolanda Gray, assists with recordkeeping and reporting. The division is working towards dedicating at least one and possibly two additional operators towards cross connection control. Any prospective operators assigned to this program are required to be certified master plumbers and must be familiar with cross connection control.

Construction Permit History:

Below is a listing of projects that were completed to improve the reliability of the distribution system pumping facilities, distribution piping, and stand-by treatment facilities.

CP Number	Date	Project	Description
W891667	1/2/1989	Revisions to P.S. 4	Cl Facilites at P.S. 4
W920796	8/12/1992	Dechlorination System	SO2 feed system to de-cl2 filter effluent and backwash water to Flint River.
W931368	11/30/1993	P.S. 4 Improvements	Two 20 MGD high service pumps, one 6 MGD high service pump, valving, appurtenances, etc.
W941607	12/1/1994	Westside Reservoir	Replacement of roofing system, masonry restoration and repairs to expansion joints.
W941678	12/20/1994	C.S. 3 & Dort. Reservoir Inlet	Installation of PRV's at Dort Reservoir and C.S. 3.
W991021	3/23/1999	Cedar St. P.S. Vavle Repl.	Replacement of pump control valves and installation of butterfly valves for each pump.
W991027 W991208	3/10/1999 6/21/1999	GM Transmission Main Repl.	Replacement of 24" trans. Main at GM to serve expansion of facility
W991111	6/23/1999	WTP Rehab Ph I, Seg 1	WTP Rehab, incl. rapid mix, flocc. Basins SCADA contr. And boiler building.
W001136	6/22/2000	WTP Rehab Ph I, Seg 2	WTP rehab, incl. primary clarifier, sanitary sewer connections.
W011130	6/21/2001	WTP Rehab Ph I, Seg 3	Softening, 12 filters, chem feed, O3, residuals mgt.
W041019	2/24/2004	Beech and Wellington St. WM Replacement	
W041082	6/1/2004	Pierson Rd WM Replacement	

The city implemented a plan review/approval process for new watermain extensions and the plan has been in effect for several years.

SOURCE

Capacity

Pumpage & Usage (MGD)

Year	Max Day	Date	Avg. Day	Min. Day	Date	Max/Avg	G/C/D	% unacct.H2O
1996	24.940		22.160			1.1255	160	
1997	30.450		19.990			1.5233	144	
1998	27.470		19.680			1.3958	142	
1999	32.170		19.280			1.6686	139	
2000			17.670			0	143	
2001	26.030		18.130			1.4357	146	
2002	26.440		18.400			1.437	148	
2003	30.050		19.900			1.5101	160	
2004	23.040		17.400			1.3241	140	
2005						#DIV/0!	#REF!	
2006						#DIV/0!	#REF!	

		Date
Five Year Max. Day	30.050	
Ten year Max. Day	32.170	
Five Year Avg. Day	18.300	
Peak Hour (Hydropneumatic)		

Max Day for capacity requirements: 36.0 MGD

Total Source Capacity: >70 mgd

Firm Source Capacity: 36.000 mgd *

Firm Source Capacity/Max. Day: 100%

Comments: The average and maximum daily demand for the city has decreased approximately 15% since the mid 1990s.

* The City of Flint has completed Segments 1-4 of Phase I of the WTP rehabilitation project. The WTP is expected to initiate its first comprehensive test run during the month of May 2006.

The city has not determined whether Phase 2 will be pursued.

STORAGE

Construction, Controls & Maintenance

	Location: Dort Reservoir	Location: WTP	Location: WTP	Location: Cedar St	Location: Westside
Volume	20 MG	2 MG	3 MG	20 MG	12 MG
Type	ground	elevated	ground	ground	ground
O.F. Elevation					
Date Constructed	1966	1952	1948	1948	1970
Date Inspected	1992	1996	1996	1997	2003
Date Painted Inside	na	1996	na	na	na
Paint System	na	epoxy	na	na	na
NSF Std 61 Compliant (Y/N)					
Date Painted Outside	na	1996	na	na	na
Cathodic Protection	na	yes	na	na	na
Tank Isolation Valve					
Tank Drain (Hydrant)					
Altitude Valve					
Mud Valve					
High Alarm	yes	yes	yes	yes	yes
Low Alarm	yes	yes	yes	yes	yes
Type					
Total Head Range (Feet)					
Normal High Water Level					
Normal Low Water level					
Range of Operation ft	730-750	898	708.5-726	737.2-757.2	761.8-779
Normal/Average Pressure					
Chart recorder					
Telemetering System					
Vents Screened					
Overflow Screened					
Access Hatches Locked					
Expansion Collar Lubricated					
Deflection Plate					
Overflow Splash Pad					
Site Fenced/Locked					

Capacity

Usable Storage			
Total Usable Storage	57,000,000 gal	57.000 mgd	
Total Usable Storage/Max Day	177%		
Total Usable Storage/Avg Day	311%		

Comments:

Storage Facility Comments:

Dort:
The Dort reservoir is filled via control station #3. The main to CS 3 tees off the 72"ϕ main upstream of CS 2. WTP staff drained and inspected the reservoir in 1992 and found it to be in good condition. The vent structures above the reservoir are screened and in good condition. These structures are checked and maintained as needed (usually once a year).

#3
WTP staff drained and inspected the reservoir in 1996 and found it to be in good condition. One of the sluice Gates needed to be repaired and was completed at that time. The reservoir is equipped with an internal overflow weir and drain at an elevation of 720'. Security locks are not provided for the access hatches.

Cedar:
The cone valve in the 24" transmission main to the Cedar Street reservoir was repaired following our 2000 evaluation. WTP staff inspected the two-celled reservoir in 1997 and found it to be in very good condition. Cracking and spalling of the concrete walls was minimal. There was a very small amount of sedimentation. The baffle walls were composed of ceramic block and were in good condition.

West Side:
WTP staff inspected the reservoir in 2003 in conjunction with the roof restoration project (CP #W941607). The restoration project eliminated damage to the exterior portions of the reservoir's roof. The inspection did not reveal any build up of sediment, and the reservoir appeared to be in good condition. The reservoir's roof is no longer exposed and the problems associated with stratification of the water within the reservoir during hot weather have been minimized. The improvement allows West Side to be operated on a more continuous pumping schedule. The roof drains along the north side of the reservoir have been repaired and allow adequate drainage of the roof. The high and low alarms at both Cedar and West side are wired such that an alarm situation will either activate or shut down a pump depending of the condition.

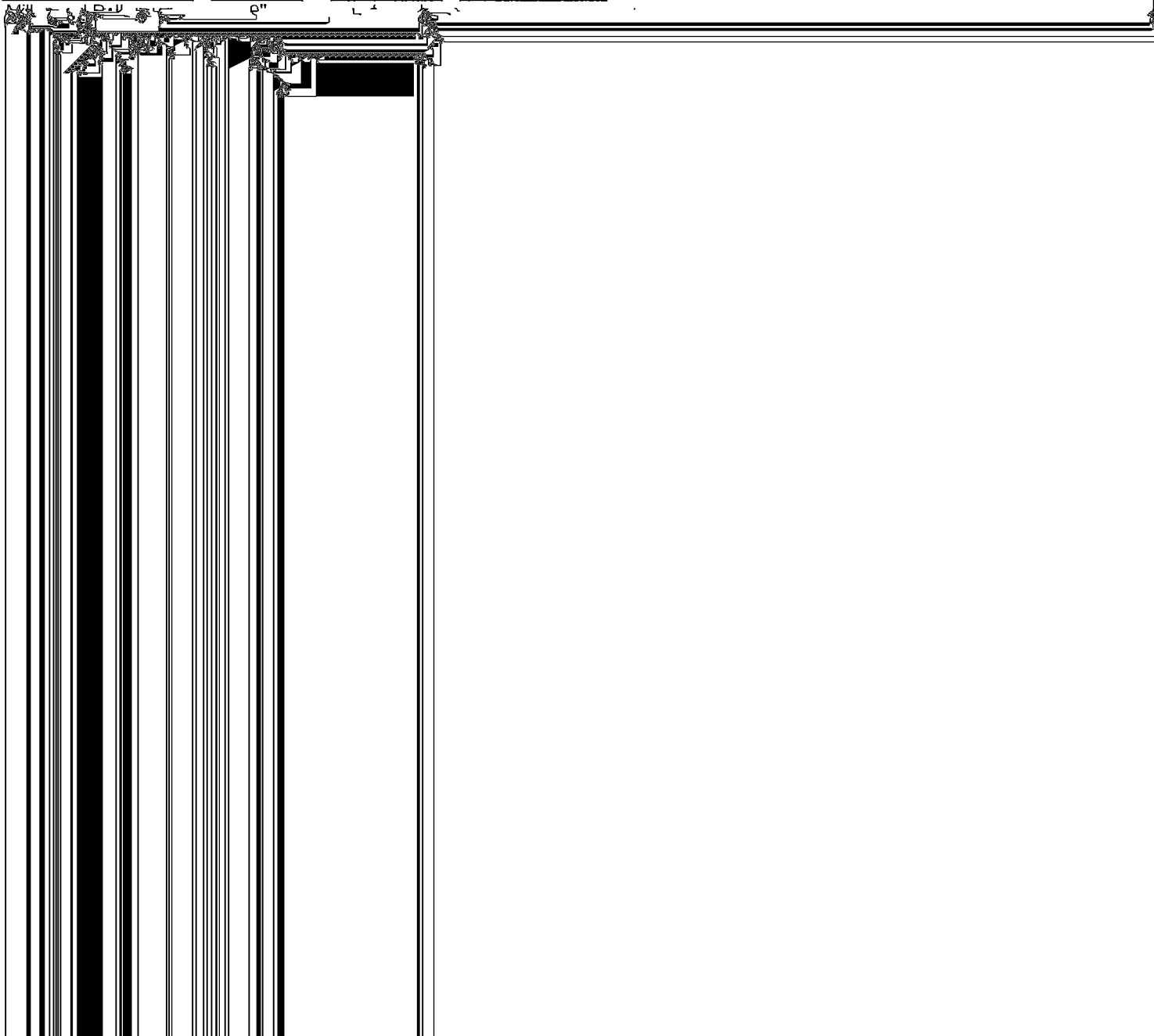
Ele. Tank:
Pressure downstream from CS #2 to the elevated tank is throttled such that the operating range of the tank is within its upper portion. The tank basically floats on the system. An interior inspection was performed in 1996 and the tank was found to be in relatively good condition. The tank's exterior was recoated at that time. Since 2000, the tank's controls were upgraded and the cathodic protection system was maintained.

DISTRIBUTION

Interconnections with Other Supplies

Is water purchased from other supplies? (Y/N)	yes
If yes, list WSSN number (s):	DWSD
No. of Emergency Connections:	

Location	Main Size	Est. Capacity	Metered?
C.S. 1	72"	>70 mgd	yes
Conn W. Flint			
Donaldson St	12"	*	yes
Person & Clio	not conn	not used	na
Carpenter and Clio	12"	not used	na
Carpenter and Bray	12"	not used	na
Van Slyke Rd	24"	not used	na
Richfield	12"	not used	na
Woodrow and Center	8"	not used	na
East Atherton	12"	not used	na
[illegible]	6"	[illegible]	[illegible]



Distribution Piping

Identify distribution piping materials - estimate percentages:

Cast Iron	na %
Ductile Iron	na %
PVC	na %
AC	na %
HDPE	na %
Galvanized	na %
Concrete	na %

Estimated percent of piping with coal tar lining Not encountered %

The majority of Flint's distribution system consists of cast-iron and ductile iron piping up to 24" main sizes. The Percentage of CI and DI main is not known at this time. The majority of the larger transmission mains (>24") consists of steel piping.

Identify distribution pipe sizes - estimate percentages:

2"	0.2 %
4"	3.4 %
6"	50.9 %
8"	23.6 %
10"	0.4 %
12"	8.3 %
16"	1.3 %
18"	2.1 %
24"	4 %
30"	0.5 %
36"	0.4 %
42"	0.1 %
48"	0.1 %

The city has replaced watermain since 2000, however, the overall shift in percentages is less than 1% in all catagories.

DISTRIBUTION

Pump Stations

Location: Cedar Street
Function: Provide supply from 20 MG Cedar St reservoir during peak demand

Pump Number	1	2	3
Year Installed	1948	1948	1948
Type	centrif	centrif	centrif
Permit Capacity			
Permit TDH			
Current Capacity	12 mgd	9 mgd	9 mgd
Basis			
Current TDH	160'	160'	160'
HP	500	350	350
Last Complete Inspection			
Last Efficiency Test			

Auxiliary Power

Power Type: NONE

Total Pump Capacity: 30 mgd

Firm Pump Capacity: 18 mgd

Auxiliary Power Capacity: _____ mgd

Max Day Demand @ this location _____ mgd

Peak Hour @ this location _____ gpm (Hydropneumatic Stations)

Avg Day Demand @ this location 1 mgd

Firm Pump Capacity/Max Day _____ %

Peak Hour/Firm Pumping Capacity _____ % (Hydropneumatic Stations)

Aux. Power Capacity/Avg Day _____ %

Comments:

A detailed pump inspection including a pump efficiency test has not been performed within the past five years.

Daily pumpage is estimated and is recorded on the daily sheets.

The Cedar Street pumping station consists of three single stage horizontal centrifugal pumps that takes suction from an adjacent 20 mg reservoir during peak demand periods. The reservoir is re-filled during low demand periods. Pump operation and filling of the reservoir can be controlled at the WTP or manually at the booster station. Pump operation setpoints are located within the distribution system.

The average day demand through this station is determined by the amount of water taken from the storage reservoir. The station operates on a pump and fill cycle and alternates with the westside pump station on an every other day basis. This station is capable of metering total pumpage on a daily basis. The pump status is relayed via the SCADA system to the operations center.

The electrical controls and switchgear, late 40's vintage, remain outdated and most of the replacement parts are no longer available. A complete rehabilitation of the electrical system is still needed at Cedar Street. Also

the building roof is in need of replacement. Soft-starts for each pump may also be included with the improvements. These improvements are planned in Flint's 2006 annual budget.

Pump maintenance consisting of lubrication and inspection is conducted once a month on all pumps at all of the booster pumping stations. Each pump is operated at least once a month.

Two of the existing cone valves were replaced with 14" pump control valves for pumps 2 and 3. Butterfly valves were also installed on the discharge side of all three pumps. Pump 1 is still controlled by the existing cone valve, however, the vavle has performed satisfactorily.

The gas chlorination system was removed and replaced with the ability to feed sodium hypochlorite. Three chlorine feed pumps are available at the pumping station. A new chlorine residual analyzer was installed and the information is relayed to the operations center.

The pump station is well maintained and the housekeeping is above average.

Westside Pumping Station (P.S. No. 5)

Location: Westside
Function: Provide supply from an adjacent 12 mg reservoir during peak demand.

Pump Number	3	4	1	2
Year Installed	1970	1970	1970	1970
Type	turbine	turbine	turbine	turbine
Permit Capacity				
Permit TDH				
Current Capacity	8 mgd	8 mgd	4 mgd	4 mgd
Basis				
Current TDH	142'	142'	142'	142'
HP	200	200	100	100
Last Complete Inspection				
Last Efficiency Test				

Auxiliary Power

Power Type: None

Total Pump Capacity: 24 mgd

Firm Pump Capacity: 16 mgd

Auxiliary Power Capacity: _____ mgd

Max Day Demand @ this location _____ mgd

Peak Hour @ this location _____ gpm (Hydropneumatic Stations)

Avg Day Demand @ this location 1 mgd

Firm Pump Capacity/Max Day _____ %

Peak Hour/Firm Pumping Capacity _____ % (Hydropneumatic Stations)

Aux. Power Capacity/Avg Day _____ %

Comments:

A detailed pump inspection including a pump efficiency test has not been performed within the past five years.

Daily pumpage is not metered at Westside.

The Westside pumping station consistes of two three stage turbine pumps and two two stage turbine pumps that take suction from an adjacent 12 mg reservoir during peak demand periods. The reservoir is re-filled during low demand periods during the winter months. During the summer months the station operates on a continuous pump and fill cycle and the operation alternates every other day with the Cedar Street station. Pump operation and filling of the reservoir can be controlled at the WTP or manually at the booster station. Pump operation setpoints are located within the distribution system.

Flow is measured by the elevatioin changes in the reservoir along with the pumping duration of the operating pumps within the facility. Direct metering to record daily demands is not provided at West Side.

Modifications to the pump-discharge valving is needed. The existing 4 mgd pumps are equipped with swing check valves. This design causes rapid valve operation during pump start-up and bumps the distribution piping downstream and most likely contributes to the main breaks in this area. The larger pumps are equipped with cone control valves, however these are not functional. One butterfly control valve is out of service. The other control valve utilizes a hydraulically operated butterfly valve however, these valves have not worked since 1990. The city has budgeted funds for 2006 and 2007 for new pump control valves at West side. Butterfly valves will also be provided for the two larger pumps.

The gas chlorination system was removed and replaced with the ability to feed sodium hypochlorite. Three chlorine feed pumps are available at the pumping station. A new chlorine residual analyzer was installed and the information is relayed to the operations center.

The switchgear has been re-conditioned and the station piping repainted.

Pumping Station No. 4 (P.S. No. 4)

Location: P. S. #4
Function: Provide supply from 20 mg reservoir during peak demand.

Pump Number	7	8	1	2	9
Year Installed	1994	1994	1949	1949	1994
Type	turbine	turbine	turbine	turbine	centrif
Permit Capacity					
Permit TDH					
Current Capacity	20 mgd	20 mgd	20 mgd	25 mgd	6 mgd
Basis					
Current TDH	185'	185'	185'	185'	185'
HP	800	800	800	1000	
Last Complete Inspection					
Last Efficiency Test					

Auxiliary Power

Power Type	none	
Total Pump Capacity	85	mgd
Firm Pump Capacity	60	mgd
Auxiliary Power Capacity		mgd

Max Day Demand @ this location _____ mgd

Peak Hour @ this location _____ gpm (Hydropneumatic Stations)

Avg Day Demand @ this location _____ mgd

Firm Pump Capacity/Max Day _____ %

Peak Hour/Firm Pumping Capacity _____ % (Hydropneumatic Stations)

Aux. Power Capacity/Avg Day _____ %

Comments:

A detailed pump inspection including a pump efficiency test has not been performed within the past five years.

A stand-by power generator exists but is not capable of providing sufficient power. Dual electrical feeds have been provided for P.S. #4 from two separate substations.

Pump Station #4 was rehabilitated in 1994. Three pumping units were added, two 20 mgd pumps and one 6 mgd pump to improve turn over on the 20 mg Dort reservoir. The project also included installation of a second 42" discharge line. This project increased the firm pumping capability of PS 4 to 60 mgd. Pumps 3-6 are low lift pumps and are not utilized for pumping treated water to the distribution system. Pump 9 is used to continuously turn-over the Dort reservoir.

Torrey Road Pumping Station

Location: Torrey Road
Function: Boost pressure to the SW portion of the city

Pump Number	1	2	
Year Installed	1954	1954	
Type	centrif	centrif	
Permit Capacity			
Permit TDH			
Current Capacity	2.8 mgd	4 mgd	
Basis			
Current TDH	65'	100'	
HP	40	125	
Last Complete Inspection			
Last Efficiency Test			

Auxiliary Power

Power Type None

Total Pump Capacity 6.8 mgd

Firm Pump Capacity 2.8 mgd

Auxiliary Power Capacity _____ mgd

Max Day Demand @ this location _____ mgd

Peak Hour @ this location _____ gpm (Hydropneumatic Stations)

Avg Day Demand @ this location _____ mgd

Firm Pump Capacity/Max Day _____ %

Peak Hour/Firm Pumping Capacity _____ % (Hydropneumatic Stations)

Aux. Power Capacity/Avg Day _____ %

Comments:

A detailed pump inspection including a pump efficiency test has not been performed within the past five years.

The Torrey Road station functions an in-line booster pump station and takes suction form a 24" transmission main along Hammerberg Rd. This station boosts pressures in the SW portion of the city. Pump operation is based on a pressure monitor located at Brown St and Brakley Ave.

The larger pump at this station is rarely used due to its high discharge head. A new, smaller pump or a variable frequency drive is needed at this facility for more reliable and efficient operation.

Improvements are planned for the Torry Road station. Several alternatives are being evaluated and include adding to the existing station or construction of a new station. In either alternative, variable frequency drives, replacement of all pumping and electrical equipment, additional pumping capacity, and establishment of an additional pressure district will be provided. The city has included this project in their 2007 budget.

General Comments:

All pumping stations are visited five times a week and sampled twice a week. All of the stations appear well maintained and the housekeeping is above average.

Pump availability, electrical controls, switchgear and stand-by power are important issues that need to be addressed among all four pumping stations. The city needs to follow through with improvements that are budgeted for during 2006 and 2007.

DISTRIBUTION

Operational Concerns & Maintenance

Are there areas where water main breaks are frequent? (Y/N) yes

If yes, identify locations:

Oxley Dr
Susan St
Flemming Rd
Flushing Rd past Milbourn
Dupont St. From Flushing Rd to Dayton
Area SE of Swartz Creek Valley Park
Boulevard Dr near Army Reserve
Janet Dr and Webster Rd
Avril St

Comments: Main breaks also occur in many other areas of the city. It appears that the most frequent breaks occur in the areas listed above.

Are there areas where aesthetic water quality complaints are frequent? (Y/N) no

Comments: In general, water quality complaints are not received. Occasional complaints do occur from unanticipated flushing following street sweeping work and those associated with watermain repairs.

Do you receive complaints alleging illness due to the water? (Y/N) _____

Is a procedure in place to respond to and track these complaints? _____

Comments:

Are there areas where customers complain of low pressure? (Y/N) no

Comments: Recently there hve been no low pressure complaints. Any complaints that are received are usually attributed to failed service or corroded plumbing. Low pressures in the area known as Hospital Hill have been alleviated with the new tie-in along Sunset and discontinuation of the City/Genesee county connecteion at Beecher Rd.

DISTRIBUTION

Operational Concerns & Maintenance

Are there areas where fire flows cannot be maintained? no

Comments: The majority of the city's system has adequate transmission piping to convey sufficient flows and pressures for fire protection.

Last ISO report date? could not be found Rating _____

Which, if any, of the above listed areas has the supply prioritized for main replacement, upgrading, or looping? Also, if a definite schedule for capital improvement has been established, list the proposed completion date.

Previous DWRF project plan proposals identified various distribution and transmission system improvements. These improvements were broken into several phases. The city did not score high enough to qualify for funding, however, these improvements remain as water system needs.

Phase 1: Replace 8200' of 12" main in Flushing Rd from DuPont to Eldorado St.
Replace 1900' of 24" main in DuPont St from Flushing north to Mackin.

Phase 2: Replace 8500' of 24" main in Dupont St from Mackin to Seminole St. This also includes Seminole st, Welch Boulevard, Euclid Ave, Stockdale St Iroquois Ave and Passadena St.
Install 350' of 8" main in Edgemont from Beecher north to VanBuren

Phase 3: Replace 1100' of 16" main in DuPont St from Chevrolet to West 3rd st. Replace 2900' of 12" main in McClellan St. from Iroquois Ave to Fleming Rd.

Phase 4: Replace 7700' of 16" main on Pierson rd from Clio Rd to MLK Jr Ave.

Comments The city received approx. $200,000 from community block grant funds in 2004 and utilized these funds for valve replacement in Pierson Rd and Flint Park Areas. The city did not receive grant funding in 2005.

The city anticipates between $300,000 and $400,000 in community block grants in 2006 and these funds will be used for hydrant and valve replacement. The WDD would like to see all of the 3 and 4" mains be replaced.

New 16" main was installed along Pierson Road thus completing a portion of phase 4 of the suggested water system improvements.

The city is considering to replace watermain in Flushing Rd in 2007 listed in phase 1 of the water system improvements.

It does not appear that the city has a capital improvements plan in place for WM replacement.

DISTRIBUTION

Hydrants

Number of Hydrants	4500	
Number Without Auxiliary Shut-Off Valves	not aware of any	
Number that are Self-Draining	undetermined	*
Number of Inoperable Hydrants	5	**

Frequency of Hydrant inspection: 1/yr (fall)

Inspection Staff: L18 Maintainers L19 Equip. Ops.
Dist. Foreman

Comments:
* All hydrants are ordered plugged, however, a few are unplugged.
** The number of inoperable hydrants is always changing. Hydrants that are found in a state of disrepair are usually repaired within one week.

Are there areas where additional hydrants are needed? some areas

* - Would like to establish a 300-500' hydrant spacing standard.

Hydrant location system yes Accurate? yes

-Records depicting hydrant blueprints and cards are in place and appear to be accurate.

Are hydrants color coded for capacity? yes

- Hydrant caps are coded by main size, but this coding system is not consistant. WDD intends to paint hydrant bonnets according to main size.

Has this information been provided to the fire department yes

-Fair communication with fire dept.

Frequency and seasons of hydrant flushing 1/yr (fall)

-Hydrants are flushed once a year during the fall. Flushing is performed to maintain water quality and upkeep hydrants.

Purpose of flushing aesthetics

Is the public notified prior to flushing? No

Does flushing follow a specific format? somewhat

-Flushing is set-up on a per grid basis with 50-100 hydrants per grid. Usually one operator is assigned to a grid. There is no order in which the grids are flushed.

Is the volume of water used during flushing estimated? no

Is a record maintained of hydrant activities? yes

-Hydrant records and work orders are maintained, however, information from the work order has not been transferred to the hydrant records.

Comments:

Hydrant records consisting of hydrant cards and work orders exist, however, the hydrant cards are not updated to reflect recent repairs and/or maintenanace. This information is maintained separately in the work order records. The Utilities Division will request approval to purchase a data retrieval system (GBA system) in 2006 for use towards improving hydrant and valve recordkeeping. The

public is not informed of system flushing.

An improvement in comunication between the WDD and the fire dept is needed regarding the status of system hydrants. Specifically, 911 emergency service convoys information concerning broken hydrants to the fire dept. Information on recently repaired hydrants is not conveyed to the fire dept.

DISTRIBUTION

Valves

Number of Valves: 8000-10000 MDEQ est

Number of inoperable valves: many

Are there areas where additional valves are needed? yes

If yes, list locations:
Along Saginaw St and many other areas
The WDD indicated that many of the city's valves do not work and has resulted in larger than necessary interruptions in water service to make the necessary repairs.

Valve location system: partial system Accurate? yes

Valve Turning Frequencies: no program in place

Comments:
The reason given for the lack of a valve turning program is an insufficient workforce.
The city has purchased a valve turning trailer. The city is also preparing to bid replacement of two valve trucks.

Records Maintained? < 25% adequate records of distribution system valves.

Comments:

The city's valve program remains deficient. A valve turning program is not in place for either primary and secondary system valves. Many vavles are not in working order. It is estimated that the city has between 8000 and 10000 isolation valves, but there has been little or no improvement in valve records since our 1999 survey. The majority of these cards repreent valves in mains 16" or larger. Although the location, description, and operating details are accurate much of the information has not been updated.
Little additional work has been make in the past 7 years towards re-establishing an adequate valve recordkeeping system.

If the Utilities Division acquires the GBA system, improvement in the valve program should proceed. Staff will be acquired to operate and input data into the GBA system. It appears that additional staff are needed to address the problems in the valve program.

DISTRIBUTION

Customer Service Information

Number of service connections	app. 41537
Number of metered service connections	1497

Identify service line materials and estimate percentages:

Copper	
PVC/PE/PB	
Galvanized	
Lead	

Ownership of Service	(CWS/Customer)
From Corp Stop to Curb Stop	
From Curb Stop to Property Line	
From Property Line to Meter	
Meter	

Customer Meters

Types of meters Used	
Number of Meters with Touch Pads or Other Remote Reading Devices	
Size of Meters	
Residential	
Industrial/Commercial	
Meter Testing/Maintenance Program	
Average Age of Meter is System	
Residential/Commercial/Industrial	
Criteria for Changeout	
Number or Percent Changeout per Year	
Master Meter Locations	
Calibration of Master Meters	

Meter Reading Staff/Contract: Water Office at city hall

Percent By Usage		
% Residential	29%	
% Commercial	71%	
% Industrial		
% Other		

Comments:

The WDD does not have an exact number or metered service connections, however, a residential meter change-out program is in progress. The city ordered 42000 residential meters (5/8 and 1" meters). The WDD is aware of additional residential meters (1.5" - 2" sizes) that are needed. Approximately 7000 additional meters in this size range are needed for a complete residential meter change-out.

Approx. 3500 small business accounts exist throughout the city. These are noted as small commercial accounts eligible for cross connection inspections.

The Water Office at City Hall keeps track of all active accounts including the number of second meters serving multiple housing units and/or irrigation meters.

% Residential	28.60%	
% Lg. Commercial & Indust.	71.40%	
% Lg. Users - List	6.40%	GM Truck
	4.30%	AC Rochester
	2.20%	Delphia
	1.10%	Buick
	0.80%	Hurley Med. Ctr.

DISTRIBUTION

System Growth

Year	No. of Residential Meters Installed	No. of Comm./Industrial Meters Installed	No. of Construction Permits Issued	Permitted Amount of WM Feet
1995				
1996				
1997				
1998				
1999				
2000				
2001				

Water Rates

What is your current rate schedule?		$/1000gals or $/qtr, $/cuM
Are current rates adequate to support O&M and CIPS?		
When was last time rates were adjusted?		
Has a water rate study been performed? When?		
Is there a meter charge or ready to serve charge?		
Is a copy of the water rate schedule and ordinance available?		

Comments: Proper operation and maintenance cannot be performed without adequate revenue.

Repair Parts Inventory

Extra Mains (Sections for Each Size in Service)	
Repair Clamps (2 or more for each size)	
Tees, Crosses & Elbows	
Hydrants	
Valves	
Services (Corp & Curb Stops, Clamps and Lines)	
Other	

Safety Issues

Confined Space Entry Program in Place % Followed (Y/N)	
Trench Safety Program in Place & Followed (Y/N)	

Comments:

PROGRAM COMPLIANCE

Cross Connection Programs

Ordinance No: 3267 Date: 1/24/1994

Approved Program (Y/N)? yes Date:

Staff Assigned to Program, (No., Dept and/or who) Utilities Administration/Cross Connections

Is Annual Cross Connection report required (Y/N)? yes

Was previous year's annual report received (Y/N)? yes Date Received: 3/26/2005

Was previous year's annual report acceptable (Y/N)? yes

Inspection Status: Rountine inspections have resumed

Device Testing Frequency: 2x/yr (high hazard) 1x/yr (mod. and low hzd)

Recordkeeping: Improving

Private Well Isolation/Abandonment Procedure:

Comments: The Utilities Administration Division along with WTP staff are becoming involved with cross connection inspections. Mr. Glen Thomas is now involved with cross connection inspections and back flow prevention on a full-time basis. William Daniels, WTP superviser, supervises the CCCP.

Annual Pumpage Reports

Is Annual Pumpage Report required (Y/N)? no

Monthly Operator Reports

Are Monthly Operation Reports required (Y/N)? yes

Were all previous year's reports received (Y/N)? yes Timely? yes

Are previous year's reports acceptable (Y/N)? yes

Comments:

Consumer Confidence Reports

Is the annual CCR requires? (Y/N) yes

Was the previous year's report received? (Y/N) yes Timely?

Was the previous year's acceptable? (Y/N) yes

Was the previous year's certification form received? (Y/N) Timely?

Comments: A copy of Flint's CCR and water quality data can be found in appendix D.

PROGRAM COMPLIANCE

Contingency Plan

Date of Most Recent Plan: 8/1/1992 Acceptable? no

Filed where? MDEQ, WTP

Comments:

the WTP's 1992 contingency plan discusses the scenario of either an inadequate amount of water or a failure of the 72" pipeline. The contingency plan does not provide sufficient information concerning critical contacts in the event of an emergency. This would include police, fire, critical customers, contractors, suppliers, etc. Other information that was provided also needs to be updated.

Flint prepared an Emergency Operations Plan (EOP) that outlines action to be followed for: source water and distribution system contamination, man made and natural disasters, and enemy attack emergencies. The EOP does not provide an outline to follow in the event of a failure of the 72" transmission main and a widespread power outage. An addendum to the EOP was to be prepared and would include these additional emergency items. Also, the EOP needs to contain a protocol for placing the WTP into service during an emergency.

The city is planning to provide stand-by power provisions at Baxter and Potter.

WTP staff indicated that repair of the 72" transmission main can be completed, however we have yet to receive a plan that outlines how this type of emergency would be mitigated.

Finally, the contingency plan and/or the EOP needs to be updated to reflect changes in emergency contacts. The revised plan also needs to include a protocol for placing the WTP into service for emergceny operation.

General Plan

Date of Most Recent Plan: 1990 Acceptable? _____

Filed Where? Water Service Center

Comments:

An updated map with 1990 distribution system info is available. The WSC also has a series of individual maps of the distribution system. Finally, the hydraulic model has been completed and contains the entire distribution system.

Reliability Study

Date of Most Recent Study: _____ Acceptable? _____

Filed Where? MDEQ, City

Comments:

The city has several completed reliability studies which discuss the issue of source reliability. The most recent study (DWRF Project Plan by SEG) addresses the issue of source reliability. The project plan also discusses future water usage and distribution system needs. The plan adequately addresses the city's transmission needs, however, much of the city's smaller distribution piping may soon be reaching the end of their service life.

Permits

Applies for and obtains permits prior to construction (Y/N): _____
Reviews plans from engineers and/or developers prior to submittal to DEQ (Y/N): _____
Standard specifications on file at CWS (Y/N): _____
If applicable, adheres to contract with supplier regarding plan submittal (Y/N): _____
Follows master plan for any construction (Y/N): _____
Actually follows plans as permitted (Y/N): _____
Develops as-built plans (Y/N): _____
Updates general plans (Y/N): _____

Capacity Development

	Submitted	Acceptable
Technical Capacity		
Site and/or general plan	_____	_____
System reliability addressed-dual feeds, standby power, storage	_____	_____
Purchase agreement	_____	_____
Financial Capacity		
Acknowledgement of annual fee	_____	_____
Annual budget plan for next 5 years	_____	_____
Sources of revenues (rates, fees, etc.)	_____	_____
Planned expenses (O&M, administrative, engineering, accounting debt service)	_____	_____
Capital improvements costs/account & plans	_____	_____
Capital replacement account and plans	_____	_____
Documentation of acceptance repayment plans from lending and bond authorities	_____	_____
Managerial Capacity		
Chain of command and clear lines of responsibility	_____	_____
Sample site plans	_____	_____
Acknowledgement of monitoring costs	_____	_____
Cross connection control program	_____	_____
Standard Specifications	_____	_____
Plans/Methods for providing legal doctrine (ordinances, policies, plans)	_____	_____
Customer complaint handling format	_____	_____
Operator training program		

MONITORING

Bacteriological

Date of Approved Site Sampling Plan: 2005

Are samples still being collected in accordance with the plan? (Y/N): yes

Number of samples required each month:

Basis for Setting Number of Monthly Samples:

Certified Lab Used:

MCL, Monitoring or Reporting Violation(s)? (Y/N):

Number & Type of Violations in past 12 months:

Public Notice Issued according to regulations? (Y/N):

Comments: The city continues to update the sample site plan due to constant changes in their routine sampling locations. A revised plan is sent to us following any changes.

Chemical

Date of Monitoring Schedule:

Are samples still being collected in accordance with the schedule? (Y/N):

Were nitrate, nitrite and fluoride (or partial chemical) samples collected? (Y/N):

If nitrate detect, what is concentration? Sample Site

If nitrite detect, what is concentration? Sample Site

Detects for metals > 50% of MCL? (Y/N):

Metals (list):

Detects for VOCs (Y/N):

Detects for SOCs (Y/N):

Date of Approved Disinfection Byproduct Monitoring Plan:

DBP Sampling Done? (Y/N/Waived):

If yes, done to site sampling plan? (Y/N):

Lead and Copper Monitoring

No. of Samples Required:	33	
Semi Annual/Annual/Triennial	Triennial	
Exceedance of lead or copper action level (Y/N)	no	
If yes, was public education issued (Y/N)	na	Date Issued:
Next Monitoring Period:	Jun-08	
Corrosion Control Program, if applicable		
Lead service line replacement status, if applicable		

Comments:
The city has adequately implemented the lead and copper monitoring program. The city participates in the modified consecutive system plan with Detroit. Their participation allows for a reduction from the full chart value of 100 sampling points to 33 points twice per monitoring period.

Radiological Monitoring

Date of Monitoring Schedule _____

Are samples still being collected in accordance with the schedule? (Y/N)	_____	Date Collected
Alpha, beta, radium, uranium	_____	Date Collected _____
Radon	_____	Date Collected _____
Tritium	_____	Date Collected _____
		_____

Detects for Rads > 50% of MCL? (Y/N) _____

If yes, list

Comments:

Conclusions and Recommendations

In general, our survey covers the major aspects of a water supply including: stand-by facilities, distribution, source capacity, and storage. Each of the above categories are evaluated on the basis of adequacy, maintenance, reliability, and operation. The evaluation also includes a check on the status of the operator certification and the cross connection control program. Finally, water quality and the utility's monitoring programs are reviewed.

Overall, the City of Flint's water distribution system continues to be rated **"Marginal"**. Improvements are needed in several key areas including: pumping station improvements, distribution system capital improvements, and in various operational programs. Until significant progress in these major areas is made, the distribution system rating will not improve. Further discussion regarding existing facilities, reliability, operation, and maintenance is provided in more detail below.

Water System Viability

The City of Flint currently serves a population of approximately 125,000 through an extensive network of transmission and distribution mains. Several booster pumping stations and storage facilities are in place to enhance service. A system of this size and complexity must have an adequate number of certified operators to adequately maintain and operate the system.

The Safe Drinking Water Act specifically sets the city's minimum certification requirement to employing at least one S-1 certified operator to oversee the operations of the water utility. The remaining staff at the Water Service Center (WSC) and the Water Treatment Plant (WTP) must also be well qualified to perform water distribution system operation and maintenance in an adequate manner and should hold some level of operator certification.

Water Distribution Division (WDD)

The WDD, supervised by Michael Brown, operates and maintains the water distribution system piping, hydrants and valves. The WDD also conducts meter reads, replaces meters, and maintains distribution system records and maps. The city continues to mandate the S-1 and S-2 certification requirement for the supervisor and foreman positions respectively. Operator certification, however, appears to have declined among the Level 18 Maintainer positions. Several certified operators in this position were unable to obtain their continuing education credits (CECs), thus their licenses have fallen to an inactive status.

Although the WDD meets the minimum operator certification requirement, we encourage the city to promote operator certification in the entry-level positions. Specifically, Distribution Trainees and Maintainers should attain and maintain their S-4 and S-3 certificates respectively. For those who acquire their S-4 or S-3 certificate, CECs must be accrued in order to keep these licenses active. Specifically, these certificates fall into a three-year renewal period during which 1.2 and 2.4 CECs for the S-4 and S-3 respectively must be accrued.

Certified operators help to protect Flint's investment in the drinking water system and to meet the Safe Drinking Water Act's requirements. Other utilities have found it beneficial to institute a bonus incentive program for attaining operator certification. We encourage the city to promote operator certification among all water operator positions. Additional information detailing the requirements for operator certification, available training, exam applications, etc. is enclosed.

Water Treatment Plant (WTP)

The WTP staff, supervised by William Daniels, operates and maintains Flint's stand-by water treatment plant. The WTP staff also maintains certain water utility programs including pipeline operation and the bacteriological and lead/copper monitoring programs. WTP staff are also responsible for monthly operation reporting, contingency planning, and public relations.

However, the city of Flint remains without an operator in charge (OIC) holding the required F-1 license to oversee operation and maintenance activities at the WTP. According to Flint's February 28, 2006 letter from Peggy Cook, City Administrator, there has been no further progress towards negotiating a draft operating agreement with Genesee County. The city has also informed us that a request for proposal to enable engineering firms to provide an interim F-1 operator has been prepared and will be distributed to several consultants. Finally, Mr. Daniels will re-write the F-1 certification exam this spring.

The next F-1 certification exam is on May 3, 2006. In the event that Mr. Daniels does not pass the exam, the city must acquire an interim OIC holding an F-1 certificate by no later than July 1, 2006. Given the time constraints, the city needs to continue negotiating efforts with Genesee County as soon as possible and/or proceed in the selection process of an F-1 contract operator. Finally, even if Mr. Daniels passes the F-1 exam, Genesee County has staff that would provide a significant amount of technical assistance in operating the WTP in the event of an emergency.

Utilities/Cross Connection Division (UCCD) - Cross Connection Control Program

UCCD is responsible for implementing the city's cross connection control program (CCCP). Mr. Glen Thomas continues to perform routine inspections and maintain records. Ms. Yolanda Gray assists with recordkeeping and reporting activities.

The city's CCCP is rated satisfactory in implementation and program administration. Based upon our discussion and review of the 2003 and 2004 annual reports, an adequate number of routine inspections are being completed among Flint's high and low priority establishments. The UCCD has also replaced the local cross connection ordinance (Ordinance No. 3267 with Ordinance No. 46-43.1) The new ordinance is generally acceptable; however, it references various city and state agencies that are outdated. Finally, we have not received Flint's 2005 cross connection annual report.

The UCCD is working towards obtaining an additional operator for CCCP implementation. We encourage the city to review the needs the CCCP with the UCCD and achieve the necessary staffing to meet the annual inspection schedules.

System Storage

Flint has five storage facilities that provide a total storage volume of 57 million gallons (MG). These facilities, based upon our survey and previous inspection records, appear to be in good condition.

Dort Reservoir

The 20 MG Dort reservoir was drained and inspected by the WTP staff in 1992 and found to be in good condition. The exterior structures including vents and overflows are checked and maintained on a yearly basis. The reservoir is due for a re-inspection.

3 MG Reservoir

The 3 MG transfer reservoir upstream of Pump Station #4 was inspected in 1996 and found to be in good condition. Repairs to an existing sluice gate were completed at that time. The reservoir is due for a re-inspection. Provisions for venting and an overflow structure should also be evaluated during the next inspection.

Elevated Tank

The 2.0 MG elevated tank was inspected and repainted both inside and out in 1996. The inspection revealed that the tank was in good condition. The elevated tank is due for a re-inspection.

Westside

The 12 MG reservoir was inspected in 2003 by WTP staff in conjunction with a roof restoration project. As part of the roof restoration project, the roof drain (scuppers) were repaired. The completed work allows for adequate drainage of the roof. The

internal inspection revealed minimal sediment build-up and the reservoir appeared to be in good condition. The reservoir should be re-inspected between 2013 and 2018.

Cedar Street

The 20 MG reservoir was inspected by WTP staff in 1997 and found to be in very good condition. Minor sedimentation was noted and, cracking and spalling of the concrete walls was minimal. Vents and overflow structures were also in good condition as noted in our survey. This facility is due for a re-inspection.

Pumping Stations

The city of Flint has four booster pumping stations. These pumping stations along with various comments and/or concerns are listed below.

Cedar Street Station

The electrical switchgear and controls remain outdated and replacement parts are no longer available. A complete rehabilitation of the electrical system is still needed at Cedar Street. It is our understanding that the city intends to proceed with electrical improvements during FY 06.

Westside Station

Valving modifications on the pump discharge piping are needed. Specifically, the two smaller pumps are equipped with swing check valves. This type of configuration causes rapid valve operation during pump start-up and this condition causes water hammer within the distribution system. This condition has contributed towards some of the main breaks in the area. The two larger pumps are equipped with cone control valves; however, these valves do not function properly. It is our understanding that the city has included new pump control valves for the Westside station in the FY 06 budget.

Pump Station No. 4

This pumping station, located at the WTP, was re-habilitated in 1994. Our inspection revealed that the facility is in good condition. Stand-by power is not provided for this facility; however, dual electrical feeds from separate substations have been provided.

Torrey Road

Improvements are planned for this pump station and are currently being designed. Based upon our discussion, the existing station will be replaced with a new station.

The new pump station will include variable frequency drives and establishment of a new pressure district.

A construction permit will be required prior to proceeding with construction of the new pump station. A set of construction plans, a basis of design for the pump station, and a permit application will need to be sent to our office for review and approval prior to issuance of the construction permit. Finally, any new booster pump station should also include stand-by power.

Tranmission/Distribution

Flint's water system consists of an extensive network of distribution and transmission mains. Our main concern with Flint's distribution system is the condition of the piping. The WDD staff continue to indicate that the majority of the three and 4-inch main in the city is in very poor condition and needs to be replaced. Specific areas in need of replacement are listed in the data-gathering portion of the survey.

Some improvements were completed since 2000 and the upgrades included transmission main replacement along Pierson Road and Beech & Wellington Streets. Next, the city is considering replacing transmission mains in Flushing Road in 2007.

Although the city has replaced some transmission main over the past six years, a high percentage of the distribution piping remains over 60 years old and is in serious need of replacement.

The city needs to establish a capital improvements program (CIP) for watermain replacement. The CIP should reference distribution/transmission improvements that are recommended in the 1999 distribution system study and hydraulic model prepared by the Snell Environmental Group, Inc. The CIP should also coordinate other distribution system improvements with sewer and road replacement projects and be based upon WDD's recommendations.

Valve Program

The WDD is responsible for maintaining and keeping track of distribution system valves; however, this program remains **deficient**.

Listed below (in a decreasing level of importance) are the elements that are essential towards establishing an acceptable valve program:

- Locate valves in critical areas, verify proper operation, and establish adequate records
- Locate remaining valves in less critical areas and establish records

- Institute valve turning program – beginning with critical valves

Next, it is our understanding that the WDD will request approval to purchase a data retrieval system in 2006 for use in improving hydrant and valve records.

It is essential that the city approve the software package that would allow the WDD to establish an adequate recordkeeping system for valves and other distribution system appurtenances. An adequate recordkeeping system is an essential component of the valve program and is vital in allowing WDD operators properly operate and maintain this infrastructure.

Finally, any valve exercising activities should also be included with individual valve records. Although it would not be possible to turn all system valves on a yearly basis, we would suggest that an exercising schedule be established especially for valves in critical locations. This should consist of reviewing all valves and determining what percentage of valves could be exercised each year.

Contingency Plan

The city of Flint needs to prepare an accurate water system contingency plan that reflects potential water system emergencies. Flint's Emergency Operations Plan (EOP) prepared in 2003 contains some of the elements of a water system contingency plan; however, much of the information (emergency contacts) is becoming outdated. In addition, the EOP addresses only a limited number of potential water system emergencies that could confront the city.

The water system contingency plan needs updated to reflect all current emergency contacts. The plan also needs to be expanded to include, but not limited to, the following water system emergencies: failure of the 72-inch transmission main, widespread power outage, large transmission main break, source water and distribution system contamination, critical equipment failures (treatment components, pumping station, storage facilities, etc). Finally, the contingency plan needs to contain a protocol for placing the WTP into service in the event of an interruption in water service from Detroit. Emergency operation of the WTP is a crucial part of the city's water system contingency plan and the plan needs to be updated to include WTP operation under this type of emergency.

Closing

Some of the items in this survey including: operator certification, treatment plant operation, and distribution system improvements were discussed in our most recent correspondence. We are requesting the city to respond to us in writing on each topic discussed in the Conclusions and Recommendations portion of the survey. Following our review of the city's response, we will schedule a meeting to discuss these issues in more detail.

Report Summary

The following is a list of items discussed in this report which must be addressed by the city of Flint. No priority is implied by the order in which the issues are presented. Page references are noted in parentheses.

1. Continue to inspect and maintain the water storage facilities. Improved security should be taken for the facilities at the WTP. (5,6,28,29)

2. Address booster pumping station deficiencies including: electrical upgrades at Cedar Street, pump discharge valving at Westside, stand-by power at each pumping station, and new pumping station at Torrey Road. (9-13,29,30)

3. Develop a capital improvements program that addresses both transmission and distribution system needs. (15,30)

4. Establish an adequate O&M program and recordkeeping system for hydrants and valves. (17,30,31)

5. Revise the water system Contingency Plan. (22,31)

6. Promote operator certification and training. (2,26,27)

GENESEE COUNTY DRAIN COMMISSIONER'S OFFICE
-DIVISION OF-
WATER & WASTE SERVICES
G-4610 BEECHER ROAD - FLINT, MICHIGAN 48532-2617
PHONE (810) 732-7870 - FAX (810) 732-9773
JEFFREY WRIGHT
COMMISSIONER

RECEIVED
OFFICE OF THE MAYOR
2005 DEC 16 PM 1:53

December 12, 2005

Peggy Cook
City Administrator
City of Flint
1101 S. Saginaw Street
Flint, MI 48502

Re: F-1 Licensed Operator
Water Plant

Dear Ms. Cook:

On December 9, 2005, David Jansen and I met with Bill Daniels, in his office, to review and discuss an improved working relationship between the two water departments.

In review of the request for an F-1 licensed operator, the County is proposing to offer a team approach to assist Mr. Daniels in operation of the facility. The team would consist of licensed operators, engineers, and a safety officer. While this seems like a lot of personnel, it really is not anymore than offering one person based upon time required to perform the work. The operators would assist Mr. Daniels in start-up and running of the plant. The engineers would assist Mr. Daniels in closing out the construction projects, and the safety officer would assist Mr. Daniels in maintaining the facility in compliance with all current regulations, both Federal and State. At the request of Mr. Daniels, I have prepared a draft agreement as a starting point to our endeavors (enclosed).

The second item we discussed was that of an emergency backup supply plan between the City and County. While it is in its infancy, I have also proposed an agreement for proceeding down this path of cooperation.

The third item discussed was a study by the County for raw water supply. As you know, the County is trying to determine our long-term water supply options. One option considers bringing raw (untreated) Lake Huron water to Genesee County and treating it to drinking water standard. The County personnel believe that this option would also benefit the City of Flint. It is recognized that the City would save money by completing the treatment plant and using Flint River water as its source of water. We believe that using the Flint Treatment Plant and treating raw lake water would increase these savings to the City of Flint through reduced construction costs and reduced operations cost. The County proposes to fund a study to calculate this option; all we are asking of the City is to provide accurate data for the study.

Based upon the above, we believe the following are the next steps:

1. Finalize a temporary operating agreement.
2. Finalize an emergency back-up operating agreement.

3. Authorization to Mr. Daniels to share information for the raw water study.
4. Presentation of the agreements to the Mayor and Drain Commissioner for their consideration.

Knowing the time constraint the City is under, the County staff and I are available at your convenience. Should you have any questions, do not hesitate to contact this office.

Sincerely,

John F. O'Brien, P.E., Director
Division of Water and Waste Services

JFO:kt

Enclosures

CC: Jeff Wright
Don Williamson
David Jansen
Bill Daniels

1. Completion of these items

Equip Shakedown

2. Daily Monitoring
Fill up. (OK)

Draft

Temporary Operating Agreement
between City of Flint Water Department (Flint) and
Genesee County Drain Commissioner's office
Division of Water and Waste Services (County)

The purpose of the temporary operating agreement is for the County to provide a licensed operator for the water treatment plant until such time the City has a permanent operator on staff or under contract. The terms of the agreement are as follows.

1. The County will provide the following services to the City:
   - Provide qualified personnel to assist the plant manager in overseeing the ongoing construction at the City water plant.
   - County will participate in progress meetings.
   - County will observe construction installation.
   - County will review completion records.
   - The County will make all recommendations and comments to the contractor through the City of Flint.

   Product: The County will prepare quarterly reports, which will contain the status of the project, for the City Mayor's office.

2. The County will monitor test runs of the water treatment plant. The County will observe all test runs of the facility and make recommendations for the operations and efficiency of the facility. All communications will be through the Plant Manager, Bill Daniels.

   Product: The County will prepare a report after each test run with recommendations and provide a copy to the Mayor's office. This report will include standard operating procedures for start-up, operations, shut down, and maintenance.

3. Upon declaration of a water emergency by the Mayor of the City of Flint, the County will take operational control of the facility. The County will issue all communications through the Plant Manager, Mr. Daniels.

PRELIMINARY

The City will perform the following:

1. The City will perform all day-to-day activities of the facility. Mr. Daniels will continue to sign monthly reports when the plant is not operating (test or emergency).

2. The City of Flint will maintain personnel records including records of operator training and continuing education reports.

3. The City shall provide the County with its water plant test run schedule 30 days prior to commencement of the test operation. This schedule shall include dates and hours of test operation, schedules of personnel dedicated to the test operation, and an inventory of chemicals on hand. good

endorse this !!

4. The City shall maintain the facility in a state of readiness for emergency operations. This shall include but not be limited to:
   - maintain sufficient (two weeks) quantity of chemicals onsite for emergency and test operations. good
   - maintain all equipment in accordance with manufacturers' requirements and as identified in the Standard Operating Procedures (SOPs),
   - financial commitment by the City to the maintenance of the facility in a state of operational readiness.

Full agreement that plant will not operate, chem, staffing

5. The City shall maintain all necessary permits and programs as required by State and Federal government. This includes, but is not limited to, source water protection plan, process safety management plan, laboratory certification.

6. The City shall maintain all communications with their residents including communications, reports, and questions and answers.

PRELIMINARY

Again, the purpose of this agreement is for the temporary operation of the water plant during test runs and emergency operations.

Cost: The County has agreed to perform the above services based upon the following fee schedule:

Item #2 (First Page of draft) Per

(Item 2) → Test runs	$2,000.00 per week
(Item 3) → Emergency operations	$2,000.00 per week

Item #1 on first page of Draft

No charge for Item #1 ?

There are no other charges contemplated in this agreement.

Insurance: The City shall provide the necessary insurance coverage for activities on their property.

Termination: The agreement may be terminated under one of the following conditions:

1. The City hires or retains an F-1 licensed operator.

2. Upon 30 day written notification to the County that the City has not fulfilled their requirements of the agreement.

OUR reading of the agreement is open ended & continues till terminated by either party

City of Flint

Date:_____ _____

Donald Williamson
Mayor, City of Flint

County Agency

Date:_____ _____

Jeff Wright
Drain Commissioner

PRELIMINARY

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

November 17, 2005

Mr. Bill Daniels, Acting Water Plant Supervisor
Flint Water Treatment Plant
4500 North Dort Highway
Flint, Michigan 48505

WSSN: 2310

Dear Mr. Daniels:

SUBJECT: City of Flint Water Treatment Plant (WTP)

This letter confirms my visit on October 27, 2005 with you and Brent White. The purpose of the visit was to discuss the following items: status of the WTP rehabilitation project, operator certification, treatment plant operation, investigation of pump submergence at the low lift station with respect to Hamilton Dam, and distribution system improvements for 2006. Each one of these items is discussed below in more detail.

Water Treatment Plant Rehabilitation

Substantial completion of Segment 5, Phase I of the WTP rehabilitation project is expected by March 1, 2006. Unit process testing and equipment shakedown of the ozone facility will begin this January. The treatment plant is expected to be capable of performing a complete test-run by next May. As we discussed, written confirmation stating the date that the WTP is capable of initiating operation needs to be provided to us.

Operator Certification

Mr. Robert Carlyon has tendered his resignation as the interim operator-in-charge (OIC) of the WTP. This latest development leaves the city of Flint without an F-1 certified operator to oversee operation and maintenance activities at the WTP.

Since Mr. Daniels has not achieved his F-1 license, the city will need to retain another interim (OIC) holding an F-1 license. As a minimum, the OIC needs to maintain an active role in various WTP operations listed below:

- Construction oversight of the on-going rehabilitation project
- Equipment shakedown
- Continuing education and operator training
- WTP test runs
- Emergency operation

The interim OIC may no longer be necessary after June of 2006 provided that Mr. Daniels obtains the F-1 license. Also, consensus from the city and the interim OIC that Mr. Daniels can operate the WTP without additional oversight from the OIC needs to be provided; otherwise, the contract with the interim OIC must be extended.

We need to hear from the city, in writing, as to what action is being taken to provide an interim OIC by no later than December 1, 2005.

Treatment Plant Operation

Completion of Phase I of the water treatment plant rehabilitation project marks the ability of the treatment plant to function as an acceptable stand-by treatment facility. To demonstrate and maintain the level of operational reliability required of this facility, some continuing level of operation will be necessary.

A proposal detailing an operating scheme for the facility must be prepared. The following operating ranges need to be established:

- Annual Basis: Propose the number of months/year the plant will be in operation.
- Monthly operation: Propose the number of hours the facility will operate in a given month.
- Weekly basis: Establish the minimum and maximum production rates and propose the number of hours of continuous operation for both these rates.

The operating ranges that the city proposes are negotiable; however, a scheme that tests all equipment, operation, and performance at varying rates is necessary. The test runs also need to be performed during critical times of the year including: peak run-off (high turbidity), summer (low flow, high temperature), and winter (low temperature).

The operating scheme must also include a plan that addresses staffing. Sufficient staffing is essential in order to maintain 24-hour operation (either for test-run or emergency operation) of the treatment facility. Based upon our discussion with plant staff, there has been a significant reduction in the number of available operators since previous plant test-runs. We are concerned whether a sufficient number of operators are available for 24-hour operation.

The city needs to determine the staffing necessary to operate the treatment facility on a 24-hour basis. Additional operators necessary for plant operation and oversight of all shifts need to be provided. Additional position(s) should require least an F-4 complete treatment license.

Following our review of the test-run proposal, we will meet with the city and plant staff to discuss test-run operation in more detail.

(5[illegible]) 764-7218

Next, if the treated water is wasted, the water must still meet the bacteriological and turbidity requirements as a condition of operational preparedness.

In addition, the operating budget for the treatment plant will need to be adequate to allow for purchase of treatment chemicals necessary to perform test-runs of the entire treatment plant.

Finally, the operating scheme for plant test-runs and mobilization of operators needs to be addressed in Flint's water system contingency plan. Emergency operation of the WTP is a crucial part of the city's water system contingency plan and the plan will need to be updated to include plant operation under this type of emergency.

Hamilton Dam

Additional field data has been obtained toward completing the low-lift pump submergence investigation; however we have not received a response from the city regarding this issue. Adequate low lift pump submergence during low flow conditions while meeting the drawdown requirements at Hamilton Dam needs to be confirmed.

Based upon the investigation, it appears that the drawdown requirements can be met; however, what is the status of the investigation and are there any conclusions? Please provide us with a summary.

Distribution System Improvements

Distribution system improvements completed since 2004 included replacement of transmission piping along Pierson Road. Major improvements planned in 2006 include: installation of new transmission main along Flushing Road and replacement of the Torrey Road pumping station. We will review distribution system issues with staff from both the Water Service Center and the WTP in more detail during our upcoming Sanitary Survey.

There are many issues noted above that the city needs to take action on. We are requesting the city to respond to us, in writing, on the Treatment Plant Operation and Hamilton Dam issue by no later than February 1, 2006. If you have any questions regarding these issues or any other water related matter, please feel free to call me at the number listed below.

Sincerely,

Michael F. Prysby, P.E., District Engineer
Field Operations Section
Water Bureau
517-335-6122

cc: Ms Peggy Cook, City of Flint
Nr. Michael Brown, City of Flint
Mr. Brian McKenzie, Genesee County Health Department

City of Flint
Site Visit
10/27/2005

1. WTP Rehabilitation Project – Status?

   Test runs & Certificate of Coverage (COC)

   Status?

2. Certification – Whose on board? Operator coverage at WTP?

3. Hamilton Dam field data & calculations - Status?

   Is the dam critical for pool depth & adequate pump submergence at low lift during low flow conditions?

4. LT2 rules

5. Distribution system improvements – what has been completed in 2005?
   what's on tap for 2006?

6. Sugar Maple Farms – permit re-issued on 7/25/05

   Status of project?

OS / 06 Budget

Speaker check ✓ ok w/ Mark

Start end on time —

Stay off the op. wtp — tough

B. 11 — writing OB Pres in NE, wis

☆ — cntr's w/ the decision { Base Load / Stay-By
Carbon Sequestration TV } 6 COM partnership to GO to Lake

Energy - smart by things are w 6 COM

40 6 COMs

not withstanding your letter on col, we instead → demonstrate we are Back on the table

Fiber Phase may 6 be better

PHASE 2 - Enhanced Pretreatment

Pol. Power purpo

issues

KMnO4 UV

if wtp op - Easy stroke - shelved

if wtp stays o/ NO discuss on this tkn is on hold

Biggest problem

* what are chances of getting discharge for Big Kahl? = empty out existing F chamber on F turn to regen gran

while in the work

Cont of Flint - needs to go on the A top

if Appeal, testimony into Lor, still stuff to 24 hr — to Fam w. wtp up. — Ref 210 LTR

Continue the need to pause Bore-Land op. of wtp

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

August 18, 2005

Ms. Peggy Cook, City Administrator
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

WSSN: 2310

Dear Ms. Cook:

SUBJECT: City of Flint Water System
Operator Certification

We have received a copy of a resolution that establishes a professional services contract with Carlyon Consulting L.L.C. The professional services contract retains Mr. Robert Carlyon as the interim operator-in-charge (OIC) for the Flint Water Plant for fiscal year 2006. Establishment of the service contract allows the city to remain in compliance with the Michigan Safe Drinking Water Act's requirement for operator certification at the treatment plant. The contract is also important in the event that the treatment plant is needed to produce water to mitigate a water system emergency.

Next, we are assuming that Mr. Mike Brown is the distribution system OIC; please verify this. In addition, a class S-1 system shall designate one or more operators holding an S-4 or higher certificate as a back-up operator. Who is the designated back-up operator for the distribution system? An operator designation form is enclosed with this letter and can be used to answer these questions.

Finally, it is our understanding that Mr. Bill Daniels will attempt to obtain the F-1 certification next spring.

If you have any questions regarding this issue or any other water related matter, feel free to call me at the number provided below.

Sincerely,

Michael F. Prysby, P.E., District Engineer
Lansing District Office
Field Operations Section
Water Bureau
517-335-6122

mfp:smb

Enclosure

cc: Mr. Bill Daniels, Flint Water Plant
Mr. Brian McKenzie, Genesee County Health Department

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

February 7, 2005

Mr. G. Robert Carlyon, Utilities Director
City of Flint Water Plant
4500 North Dort Highway
Flint, Michigan 48505

WSSN: 2310

Dear Mr. Carlyon:

SUBJECT: City of Flint Water System
Site Visit

This letter confirms my visit on January 24, 2005 with you, Bill Daniels, Michael Brown, Brent White, and Mike Gleason. The purpose of the visit was to discuss the following items: operator certification, status of the revised Certificate of Coverage (COC), investigation of pump submergence at the low lift station with respect to Hamilton Dam, crypto/E Coli monitoring for the LT2 rules under the surface water treatment regulations, distribution system improvements for 2005 and beyond, re-issuance of the Sugar Maple Farms watermain permit, and the updated bacteriological sampling site plan. Each one of these items are discussed below in more detail.

Operator Certification

It has been brought to our attention that Jeffrey Bryson has retired as operator from the city of Flint and that you will again assume the role as the operator-in-charge (OIC) of the water treatment plant (WTP). Next, Mr. Daniels will assume many of the operating responsibilities of the WTP and will pursue the F-1 certification. Mr. Daniels may be eligible to write the F-2 and/or F-1 certification exam provided that he has satisfied the criteria established in our September 7, 1989 memo to the Advisory Board of Examiners and Item #13 from the April 18, 2003 Advisory Board meeting minutes (copies of both documents were provided to you). In addition to completing the F exam application, Mr. Daniels needs to document his plant operating experience including plant test runs and start-up & testing of new equipment installed during the WTP rehabilitation project. Finally, any additional educational requirements specified in the April 18th document must also be completed prior to writing the F-1 certification exam.

Next, the topic of hiring a temporary or (contract) OIC in the event that the current OIC is no longer available was discussed. For short-term operation, it would be acceptable to retain a temporary OIC with an F-1 license to oversee operation of the WTP while Mr. Daniels pursues the F-1 license. Prior to retaining a temporary OIC, we would be interested in discussing operations under the oversight of a temporary OIC and establish contractual responsibilities. Finally, the city will need to provide us a plan of action addressing operator certification in the event that Mr. Daniels fails to obtain the F-1 license after the first attempt.

Change in COC

The Permits Section of the Water Bureau is in the process of re-issuing Flint's COC under the General Permit No. MIG640000. The new COC will allow the City of Flint to discharge 19.2 MGD of treated filter backwash and other wastewater associated with the production of potable water from the Flint WTP.

Hamilton Dam

Field data is being obtained to complete the investigation into whether adequate pump submergence can be maintained at the low lift pump station during low flow conditions in the Flint River while meeting the drawdown requirements at the Hamilton Dam. Several attempts were recently made to induce low flow conditions in the Flint River; however, significant run-off during the month of January has delayed this effort. Please keep us and the Department of Environmental Quality's (DEQ) Dam Safety Unit updated as to the status of this investigation.

Crypto/E-Coli Monitoring

Preliminary monitoring for cryptosporidium/E-Coli monitoring under the future Long-Term 2 Enhanced Surface Water Treatment Rule was discussed. The results of the monitoring performed in accordance to an approved sampling plan prior to promulgation of the LT2 rules would be eligible for grandfathering. The results would help the city to assess the need to install the appropriate treatment based upon bin placement.

We understand that you did not proceed with this monitoring. We will keep you informed about the LT2 rule as we expect promulgation of the rule later this year.

Distribution System Improvements

Distribution system improvements are expected to commence in 2005 and include replacement of watermain along Pierson Road. Next, the city is planning to proceed with valve replacement during 2006 in Flint Park through the use of Community Development

Block Grant funds. Other water system improvements anticipated in 2006 and beyond include: replacement of transmission main along Flushing Road, additional watermain replacement in the Beech and Wellington Road area, and improvements to the Torrey Road pump station plus others. We would be interested in receiving a schedule that lists these and other distribution system improvements. Finally, has the city updated their 5-year capital improvements program (CIP)? If the CIP has been updated, we would be interested in receiving a copy for our records.

Bacteriological Sampling Site Plan

We have received a copy of Flint's updated bacteriological sampling site plan. The plan was revised to reflect changes in a few of the routine and repeat sampling locations. Also, changes in contacts (local and DEQ) were noted. Based upon our review, the updated sampling site plan is acceptable. The sampling site plan should be updated every two or three years or as needed.

Sugar Maple Farms Development

Installation of watermain to serve the Sugar Maple Farms development issued under Construction Permit #W021063 on April 29, 2002 to the City of Flint has not been completed. A request for a permit extension was made by the city last summer, however, the request was denied due to possible changes in the design and ownership of the infrastructure.

As we discussed, a new construction permit needs to be issued for this project due to our new permit application process. Please re-submit the plans and specifications with the appropriate permit application. Following our review and approval, a new construction permit will be issued for this project.

We will re-visit these issues during our next site visit this spring. If you have any questions regarding these issues or any other water related matter, please feel free to call me at the number listed below.

Sincerely,

Michael Prysby

Michael F. Prysby, P.E., District Engineer
Field Operations Section
Water Bureau
517-335-6122

cc: Mr. Bill Daniels, City of Flint
Nr. Michael Brown, City of Flint
Mr. Brian McKenzie, Genesee County Health Department

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

January 23, 2004

Mr. G. Robert Carlyon, Utilities Director
City of Flint Water Plant
4500 North Dort Highway
Flint, Michigan 48505

WSSN: 2310

Dear Mr. Carlyon:

SUBJECT: City of Flint Water System
2003 Sanitary Survey Update

This letter confirms my visit on December 10, 2003 with you, Jeff Bryson, Michael Brown and Glen Thomas. The purpose of the visit was to review the status of the more critical items from the city's water system 2000 Sanitary Survey.

The city has made further improvements in certain programs including; cross connection control, operator certification, customer metering, and contingency planning. Additional administrative steps have been taken which should set the stage for transmission/distribution system and pumping station improvements during 2004 and 2005. Given the improvements completed in the various programs, Flint's water system rating shall improve to **"Marginal".** Further progress, however, must be made in the following areas in order to maintain or improve the water system rating further.

1. Update the local cross connection ordinance and program. Maintain an adequate number of staff to operate the program effectively.

2. Proceed and complete the transmission main replacement projects along Beech & Wellington, Pierson Road, and Flushing Road by 2006.

3. Update the 5-year capital improvements program and provide us with a copy.

4. Complete and implement the distribution system hydraulic model for use.

5. Develop and implement a water system valve program.

6. Re-evaluate booster pumping station improvement needs and prepare a schedule.

7. Finalize Flint's Emergency Operations Plan.

For a more thorough discussion of our updated survey please reference the attached Conclusions and Recommendations document.

If you have any questions regarding these issues or any other water related matter, please feel free to call me at the number listed below.

Sincerely,

Michael F. Prysby, P.E.
District Engineer
Field Operations Section
Water Division
517-335-6122

mfp:smb

cc: Mr. Jeffrey Bryson, City of Flint
Mr. Glenn Thomas, City of Flint
Nr. Michael Brown, City of Flint
Mr. Brian McKenzie, Genesee County Health Department

Evaluation of Community Water Supply - Water System Review Summary

Name of Supply:	City of Flint	WSSN:	2310
County:	Genesee	District:	11
Evaluator:	MFP	Date:	12/10/2003

Overall Rating Satisfactory: Marginal: X Deficient:

	Sat.	Marg.	Def.
General			
Certified Operators	X		
Capacity Assessment			
Ownership	X		
Permits	X		
Source	X		
Firm Capacity	X		
Isolation / Construction	X		
Treatment	X		
Standby Power	X		
Maintenance	X		
Storage	X		
Capacity	X		
Construction	X		
Controls	X		
Maintenance		X	
Distribution		X	
Interconnections	X		
Pump Stations	X		
Flows / Pressures	X		
Valves / Hydrants			X
Maintenance		X	
Programs and Plans	X		
Cross Connections	X		
MORs	X		
CCR	X		
General Plan		X	
Contingency Plan		X	
Reliability Study	X		
Sampling Site Plans	X		
Capital Improvements		X	
Monitoring / Quality	X		
Bacteriological	X		
Chemical/Radiological	X		

City of Flint
Evaluation Update
12/10/2003

1. **Organizational Structure & Operator Certification**

Water Dist Div (WDD) - Number of employees? 44

OIC – Level 28 (S-1)
Level 22A (forman levels) S-2s - three-four positions
Levels 12, 18, & 19 – trainee, maintainer, equip op - S-3 and S-4 certs requ for level 18 and 19 positions – status?

Updated Org. chart available? – Yes

Promoting operator cert. – job descriptions avail?
Job descr revised to reqr cert
Maintainer not updated - Both will S-4 within 2-3 yrs
Meter reading staff – status of cert. requirement?
Meter Tech – S-5

2. **Transmission/Distribution**

Hydraulic model final calibration - inconsistencies resolved? Causes?
Not Final Cal – ensure the right fire data
Test process of staff/prior to hire → once hired they will be trained
Training of staff – Status?
Data Fed & Automation Clerk will be trained

Updating of General Plan? Obtain from model, Status?
Planned for FY 04/05 – Full copy in FY 05

Utilities Dept CIP (List of mains) – what's on tap for 04? 05? Copy avail?
Beach/Welch Phasing Rd
Pierson Rd 04/05
Status of MDOT projects – some were on-hold.....
Pierson Rd was on hold – being relooked now
Other MDOT projects – Pierson looking
New rate schedule to facilitate start of the CIP – Status? – is in place

Block grant funding – any of these?
yes – Beach/Welch 04/05 Funds
yes – Pierson Rd

Security specialist looking for matching grant $ to jumpstart Item #3

Back Burner due to WTP & rite then focus on WTP plus phase II repl + low westside

3. **Pumping Stations & Storage**

P.S. #4 is in phase II - prelim

Switch-gear upgrades at Cedar Street/ Stand-by Power?

- no activity yet
- V's replaced
- Re-built motors
- switch gear motors mechanical

Pump control & replacement of swing-check valves at Westside (smaller pumps)?

Pumping modifications at Torry Road – larger pump replaced or VFD?

Replace Pump & St B/ Power - 500 as part of an

Master Plan for upgrading pumping stations – Status?

PY as budget if city approves phase II of WTP.

Status of CL2 feed at the P.S.? — no, NS, never again

reclass to permit gas CL at Cedar/ west Provisions For Liq. CL at the sites

Inspection at Westside coming due…

may be due - got Back

4. **Hydrants & Valves** - DeP — still under development

Valve identification/status - establishment of recordkeeping system, additional

map shows all VALVE locations....status?

In PY 08 - 35k valve repair plus contractor for valve program

PY 09 - 2nd K

Hydrants – inconsistencies in color coding resolved?

Valve ID > not used valve exercising

communication with fire department…

annual under flushing & training tape

Operation/maintenance – valve exercising schedule/flushing program – status?

5 hydrants to 30 valves/mo to exercise 10 valves/mo

still staff shortfall

Start of 20 in valve program worked last

Staffing needs to address these items – being addressed?

1 or - 2 add staff to be requested in PY 09

Contract operations? — poss. for valve turning

PY - 5 fold ↑ in needs/day

Radio-read meters – how is this working?

- many skipping as meter ages / cant receive etc
- 98% are in move/ready/to-use

service order

Main Breaks/overtime - brought to AMA (downtime)

- short staff/ infra failures - cut/cap takes time

going to add 2 staff in Budget — + tractor/truck

- try to get to cancel

Back log of 50 service

30 - 40 high priority

5. CCCP - Status of program

Program & Ordinance – Status of revisions?

Accounts & Inspections:

347 high & medium priority accounts (1471 devices) – 310 inspected in 2002

4,036 low priority accounts – status of inspections?

6. Watermain Review Procedure - approved policy (Jan 03)

How well is the policy working?
Any needs for revision?

7. Contingency Planning

Annex to Flint's Emergency Operations Plan received….

Remainder of plan (with details) to follow…

Does plan address loss of supply due to interruption from DWSD?

Power outage…
Transmission main break…
Contamination…
Discuss in the Technological Disaster Procedures section…

Emergency water service to Gen. County …agreement reached …..next step?

8. Segment 4 Construction Status

Ability to operate WTP during an emergency - any critical times where WTP will not be available?

GM- Delphi - City of Flint
Enviro. Coop. Committee to discuss Reg. issues

IPP
WP
CCCW
Remediation effort
co chaired by Gov Motors DEQ/ EPA OVR

Status of Segment 4 - on schedule? — FIN. SPR 05

City of Flint – Sanitary Survey 2003 Update
Conclusions and Recommendations
December 10, 2003

In general, our survey covers the major aspects of a water supply including: stand-by facilities, distribution, source capacity, and storage. The update of our 2003 survey shows that the City of Flint's water distribution system rating has improved to a "**marginal**" rating. The improved rating comes with several primary concerns which are discussed below in more detail.

1. The city of Flint continues to make improvements with their Cross Connection Control Program (CCCP). Annual inspections at high priority accounts are continuing and initial inspections have commenced at low priority accounts. Approximately 400 higher priority accounts (those having reduced pressure zone, RPZ, backflow preventer devices) exist and over 75% have complied with the RPZ testing requirement during 2002. Approximately 4000 low hazard accounts exist and approximately 1,500 of these accounts were inspected in 2003. The city intends to inspect all low hazard accounts at least once every three years.

   Flint's CCCP rating shall improve to a satisfactory status and is based upon the improvements made during 2002 and 2003. The Utilities Department, however, has determined that one additional cross connection inspector is needed in order to maintain adequate implementation of the CCCP.

   The Utilities Department is in the process of updating the local cross connection ordinance that will include a new fee schedule which will allow for an additional cross connection inspector. A draft ordinance was provided to us and is acceptable for program implementation. We would encourage the city to approve the new fee schedule contained in Sec. 46-43.2, since additional staffing appears necessary in maintaining an acceptable CCCP.

   Finally, the Utilities Department is revising the city's most recent CCCP (1989 document).

   The remaining CCCP elements need to be completed and are outlined below:

   - Complete the revision of the city's most recent CCCP ordinance (Ordinance No. 3267) and provide us with a copy.
   - Update the city's most recent CCCP (1989 revision). Provide us with a draft copy of the updated program for our review and comment.
   - Achieve the necessary staffing to complete the minimum number of routine inspections, maintain adequate records and reporting, and maintain an acceptable program rating.

2. Operator certification (distribution) continues to show improvement and is evidenced by the increased number of exam applicants pursuing their S-4 and S-3 licenses. The position descriptions for the Water Distribution & Sewer Maintenance Supervisor, Water Distribution Foreman, and the Water Construction Equipment Operator have been updated and now require the S-1, S-2, and S-3 licenses respectively. The position descriptions are also being revised for the Maintainer and Trainee positions and will call for acquiring the S-4 license within two or three years.

   It is evident that more attention is being given towards operation certification. Again, the city needs to continue to encourage and promote operator certification among the Utility Department operators who are involved in water system activities.

   Finally, the position descriptions for the meter reading staff are also being updated and the requirement for obtaining an S-5 license is still being considered. A review of the exam content, however, shows the majority of the exam questions arise from subjects that the meter reading staff are not involved with. An S-5 certification requirement to maintain a position as a meter reader would not be appropriate.

3. The DLZ Michigan, Inc. hydraulic model is essentially complete with the exception completing a final calibration and hiring the necessary technical and automation position(s) to utilize the model for its intended purpose. The hiring process for the new position(s) is expected to proceed following the completion of a test protocol that will be used in the screening process for prospective jobs applicants. The position(s) is(are) expected to be filled later in FY 04. The hydraulic model will also be completed and implemented for use at this time. As we discussed, the model should be used for verifying hydraulic improvements, input of hydrant and valve information, and generation of system plans and maps.

   A primary concern with the Flint water distribution system continues to rest with the condition of the piping. Many mains are in poor condition and in need of replacement. Due to budget constraints the city has not proceeded with the suggested Capital Improvements Program (CIP) for watermain replacement in 2002 and 2003. The city, however, has secured Community Development Block Grant funding and approved a new water rate structure that will allow for distribution system improvements on a yearly basis. Improvements slated for FY 04 include: replacement of distribution main along Beech and Wellington Streets and replacement of transmission main along Pierson Road. Replacement of transmission main along Flushing Road is expected to commence in FY 05.

   It is our understanding that the 5-year capital improvements program (CIP) is being updated to reflect the water system improvements that can be completed based upon the available grants and the new rate structure. Please send us a copy of the updated CIP when it becomes available.

4. A major concern continues to lie with Flint's deficient valve program. Funding has been set-aside for FY 04 and 05 for repair and exercising of distribution system valves, however, there has been little if any progress towards exercising system valves and establishing an adequate recordkeeping system. The availability of a sufficient sized workforce needed to improve the valve program continues to pose a problem. The Utilities Department will request for additional staff beginning in FY 05 to help address this program need. It would be worthwhile to prepare a schedule that outlines a valve program for implementation.

   Next, additional water department staff also appears needed to address concerns regarding repair of main breaks and completing water service orders in a timely basis. The city needs to review the workload and staffing needs that will be described by the Utilities Department and approve the additional positions needed to improve this program.

   Finally, the city has replaced the majority of it residential and commercial meters with radio read meters. This is a significant improvement and is allowing the utilities department to conduct more accurate meter reads in a shorter amount of time.

5. The Booster Pumping Station Master Plan discussed during our 2000 survey has not been prepared. However, certain improvements including: replacement of cone valves with check valves, rehabilitation of motors, maintenance of switchgear, installing new transformers, and replacing the roof at the Cedar Street facility were completed.

   Other significant pump station improvements need to be completed and include; upgrading the switchgear at Cedar Street, replacing the swing check valves on the smaller pumps at the Westside pump station, and completing pumping modifications at the Torrey Road pump station. It is our understanding that these improvements along with provisions for booster pumping station stand-by power will be included in the report for Phase II of the water treatment plant rehabilitation project. A review of critical customers downstream of the Torrey Road pump station and a determination of the need for stand-by power at this facility prior to Phase II of the water treatment plant project should be performed.

   Finally, according to our records, the water storage reservoir at the Westside Pumping Station is coming due for an internal inspection.

6. We have received an Emergency Operations Plan (EOP): Utilities, prepared by the Utilities Department that constitutes a water system contingency plan. The EOP outlines emergency procedures to be followed for the following events; source water and distribution system contamination, man-made and natural disasters, and enemy attack emergencies.

The EOP, however, does not include an outline showing mitigation of the following emergencies; failure of the 72-inch transmission main and a widespread power outage. You indicated that an emergency procedure addressing failure of the 72-inch transmission main will be prepared and included in Appendix 4 of the EOP (Technological Disaster Procedures). As we discussed, the outline needs to summarize the coordination among all parties (Utility & WTP staff, Flint, GCDC, & DWSD officials) as to who will conduct the repair. The availability of repair parts must also be ascertained.

Next, you mentioned that mitigation of a widespread power outage cannot be incorporated into the EOP since provisions for stand-by power will not be addressed until Phase 2 of the water treatment plant rehabilitation project. It may still be worthwhile to outline the procedure(s) of utilizing existing city infrastructure (storage facilities, interconnections, emergency water use reduction, etc.). This section can be left open for further revision when stand-by power issues are addressed during Phase 2.

Next, the EOP should also include a supplement that discusses other types of critical equipment failures (treatment components, pumping station, storage facilities, etc). An emergency procedure addressing this type of related emergency can also be included in Appendix 4 of the EOP.

Finally, the EOP also needs to contain a protocol for placing the WTP into service during an emergency. Although the WTP is in the midst of Segment 4 construction, an interim procedure should still be established. The start-up protocol will likely change as the rehabilitation project approaches completion. A final protocol should be developed after completion of the treatment plant rehabilitation project.

Please provide us with a copy of any additional supplements for inclusion into our copy of the EOP. We will review these and provide you with any additional comments, suggestions, and/or questions.

Utilities Department accomplishments of note—First Quarter—September, October & November 2003

- **Implemented FY 04 Water and Sewer rates as determined by the rate study.**

- **Successfully applied for $19,180,000.00 in low interest Drinking Water Revolving Fund loan monies. This will complete Segment 4 and Segment 5 of Phase I of the Water Plant Rehabilitation. Construction is anticipated to be complete by April, 2005.**

- **Successfully negotiated a water rate reduction with DWSD based upon corrected data on peaking factors that resulted in $1.9 million in savings to Flint. DWSD additional work in verifying this data will result in an additional credit of a little over $5,000 per month on the rates charged for FY 05.**

- **The commercial and industrial water meter replacement program will be completed by calendar year-end. Over 1,400 meters have been replaced to date. Significant revenue increases are expected when the program is complete and entered into the City billing system. The number of estimated water and sewer bills will likewise drop when this is completed.**

- **Over one thousand residential water accounts did not have the water meters replaced during the 1997-99 replacement program. The City has been divided into three sections and two of those sections are now complete. Nearly every address in those two sections has either had its meter replaced or has been removed from the records due to having been demolished. The third section (primarily in the North end) is proving somewhat more troublesome, but efforts have begun in that area. The program is on schedule for completion by Spring, 2004.**

- **Design of the Beech and Wellington neighborhood water main replacement project, funded by CDBG, is complete and bidding is expected to take place in January with construction to take place in the Spring, 2004. This project replaces aged four-inch water mains with eight-inch mains which will improve water quality and fire-fighting capabilities.**

- **Planning for the Pierson Road water main replacement and street reconstruction project is underway. The City obtained $450,000 in federal funding to help offset the costs of the water main work. Design work will be completed within the next quarter and bidding for the construction contract is anticipated in April or May.**

By end of JAN

Meter prog

Budget prog

Replaces 3½ miles of 16"
one of higher priority projects in the DWRF Project PLAN

Utilities Department accomplishments of note—June, July, August 2003

- Completed Water and Sewer Rate Study. ✓
- Agreed to an amendment to the water sales contract between Flint and Genesee County to more accurately reflect the actual cost of service. ✓
- Applied for a DWRF low interest loan to complete Segment 4 and 5 of the Flint Water Plant Rehabilitation—loan award to be announced in September. ✓
- Began replacement of commercial and industrial water meters—projected increases in revenue due to increased accuracy of metered sales are guaranteed to more than offset the expenditure of some $3 million. ✓
- Established a program to replace those residential meters that were missed during the original replacement program—30% of the City has been completed. ✓
  In these areas
- Contracted for design of Beech and Wellington Streets water main replacement utilizing CDBG funds for infrastructure replacement.
  waiting for spicer for final plans
- Completed revisions to the proposed Sewer Use Ordinance to address the objections raised by General Motors and Delphi; revised ordinance under review by Law Office, General Motors and Delphi.
- Established an interdepartmental committee to address Stormwater regulatory compliance issues.
- Established a joint General Motors/City of Flint Environmental Cooperation Committee to improve communications and foster better working relationships.

03-059

PRESENTED: APR 09 2003
ADOPTED: APR 09 2003

Submission # 03EFM0203

RESOLUTION AUTHORIZING ENTERING INTO A REVISED CONSENT ORDER WITH THE MDEQ FOR COMPLETION OF THE REHABILITATION OF THE FLINT WATER PLANT

BY THE EMERGENCY FINANCIAL MANAGER:

In 1999, the City of Flint entered into a consent order with the Michigan Department of Environmental Quality for the rehabilitation of the Flint Water Plant. That agreement included a schedule for completion of Phase I of this project. Due to the fact that the City failed to qualify for a Drinking Water Revolving Fund loan last year, it is now impossible to meet the schedule included in the original order. Therefore, the MDEQ has agree to revise the original consent order to account for the delay and this revised consent order will have a new schedule for completion of the work..

BE IT RESOLVED that the appropriate City officials are hereby authorized to enter into a revised consent order with the MDEQ for the completion of the rehabilitation of the Flint Water Plant.

APPROVED AS TO FORM:

Karen Dewsbury Folks
Karen Folks
Interim Chief Legal Officer

DIRECTED TO:

ENACT ____ REFER TO COUNCIL ____ FAIL ____

DATED: 4-9-03

Edward J. Kurtz
Emergency Financial Manager

APPROVED AS TO FINANCE:

Peter Dobrzeniecki
Finance Director

APPROVED AS TO BUDGET:

Melanie Purcell
Budget Director

RECEIVED
APR 29 2003
DEPARTMENT OF ENVIRONMENTAL QUALITY
SHIAWASSEE DISTRICT

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER DIVISION

In the matter of administrative proceedings against:

City of Flint
Municipal water system

WD Order No. P-99009

/

MODIFICATION OF CONSENT ORDER

The Department of Environmental Quality ("DEQ"), Water Division (WD) and the City of Flint ("City") entered into Consent Order No. P-99009 ("Consent Order"), which became effective on August 31, 1999. The Consent Order entered between the DEQ and the City included requirements for the upgrade of the City's municipal water treatment plant. On December 13, 2002, the City sent a letter to the DEQ requesting a one year extension of the timelines outlined in Section III. Compliance Program of the Consent Order. The DEQ and its Director are authorized under Section 15 (MCL 325.1015) and Section 16 (MCL 325.1016) of the Michigan Safe Drinking Water Act, 1976 P.A. 399, as amended, Administrative Rule 325.1028, and Section 78(2) of the Administrative Procedures Act (MCL 24.278(2)) to enter into and enforce the conditions of the Consent Order. By entry of this Modification of Consent Order, the DEQ and the City agree and stipulate to the following modifications of the Consent Order:

1. Paragraph 3.1.d and 3.1.e of the Consent Order shall be modified to read as follows:

   Except as provided elsewhere in the Consent Order, the City agrees to complete renovations to the water treatment plant according to the following schedule:

   (d) Phase I-Segment 4: Softening with lime feed including ferric bulk storage tanks, filter rehabilitation, raw water pump rehabilitation, filter backwash residual management, locker and lunchroom facilities.

   Construction permit issued by DEQ on June 10, 2002

   Notice to proceed on or before October 1, 2003

   Segment construction completed and capable to initiate operation on or before March 1, 2005

(e) Phase I-Segment 5: Ozone facilities

Issuance of construction permit on or before June 30, 2004

Notice to proceed on or before October 1, 2004

Segment construction completed and capable to initiate operation on or before June 1, 2006

2. The City shall pay stipulated penalties outlined in paragraph 4.1 of the Consent Order for failure to comply with the modified subsections (d) & (e), paragraph 3.1 above.

3. In addition to penalties required under paragraph 4.1 of the Consent Order, the City shall pay accrued stipulated penalties in the amount of **FIVE THOUSAND TWO HUNDRED ($5200) DOLLARS** to address and resolve the City's past status of non compliance (September 21, 2002-December 13, 2002) with section III. Compliance Program of the Consent Order. This penalty shall be waived only upon the City's adherence with the modified subsections (d) & (e), paragraph 3.1 above. Payment shall be made within thirty (30) days after a written demand is made by the MDEQ.

The DEQ and the City agree and stipulate that all other terms and conditions of the Consent Order are not altered or amended by the entry of this Modification of Consent Order. The DEQ and the City further agree and stipulate that the enforcement provisions of the Consent Order, including paragraph 4.1, shall apply to the terms and conditions of this Modification of Consent Order. The DEQ and the City stipulate that this Modification of Consent Order shall become effective on the date that it is signed by the Chief of the DEQ, Water Division.

Signatories

The undersigned CERTIFY they are fully authorized by the party they represent to enter into this Modification of Consent Order to comply by consent and to EXECUTE and LEGALLY BIND that party to it.

DEPARTMENT OF ENVIRONMENTAL QUALITY

Richard A. Powers, Chief
Water Division

5/14/03
Date

CITY OF FLINT:

Edward Kurtz, Emergency Financial Manager

Robert Carlyon, Interim Utilities Director

Inez M. Brown, City Clerk

APPROVED AS TO BUDGET:

Melanie Pureel
Budget Director

APPROVED AS TO FINANCES:

Peter Dobrzeniekci
Director of Finance

APPROVED AS TO FORM:

Karen L. Folks
Interim Chief Legal Officer

3/18/03
Date

APPROVED AS TO FORM:

By: Alan Hoffman, Assistant Attorney General
For: A. Michael Leffler
Assistant Attorney General in Charge
Natural Resources, Environmental Protection and Agriculture Division
Michigan Department of Attorney General

4/30/03
Date

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
SHIAWASSEE DISTRICT OFFICE

JOHN ENGLER
GOVERNOR

RUSSELL J. HARDING
DIRECTOR

November 25, 2002

CERTIFIED MAIL

Mr. Edward Kurtz,
City of Flint
1101 South Saginaw
Flint, Michigan

Dear Mr. Kurtz:

SUBJECT: Water Division Program Updates

Enclosed are status reports for several programs administered by the Department of Environmental Quality (DEQ), Water Division, Shiawassee District.

Status reports are provided for the following program areas:

1. Water Treatment Plant
2. Water Distribution System
3. Wastewater Treatment Plant
4. Industrial Pretreatment Program
5. Municipal Storm Water Program

In addition, also enclosed is a copy of a letter from the DEQ Water Division's enforcement unit concerning a contested case hearing regarding the National Pollutant Discharge Elimination System permit for the wastewater treatment plant.

These reports summarize the DEQ's position regarding the program areas. The city has been working diligently in many of these areas, but there are many issues that still need to be addressed.

If questions arise you may contact the DEQ staff person that prepared the report or you may contact me directly.

Sincerely,

Timothy A. Benton, P.E., Supervisor
Field Operations, Shiawassee District
Water Division
517-625-4682

Enclosures
cc: Mr. Jeff Bryson, City of Flint
Mr. G. Robert Carlyon, City of Flint
Mr. Robert Case, City of Flint WPC
Mr. Peter Dobrzeniecki, Finance Director, City of Flint
Mr. Mark Fulks, P.E., City of Flint

Status Report
City of Flint
Water Treatment Plant

November 25, 2002

Prepared By: Michael F. Prysby, P.E.
District Engineer
Water Division
DEQ – Shiawassee District Office

We understand, based on a September 12, 2002 letter from the Environmental Assistance Division (EAD) that the City of Flint requested Segment 4 of the water treatment plant upgrade to be placed on the FY03 Project Priority List (PPL). A more recent letter from EAD (October 28, 2002) states that the Drinking Water Revolving Loan Fund (DWRF) DWRF Project No. 7010-04 is no longer within the fundable range for Fiscal Year (FY) 2003. The project will remain on the list as a "Contingency Project" pending potential expansion of the fundable range.

The potential delay of Segment 4 may jeopardize the city's ability to maintain the compliance schedule set forth in Section III. Compliance Program of the Consent Order signed on August 31, 1999. There are however, provisions within the Consent Agreement (Sections II., VI., & VII.) that may allow the city to be granted an extension of the deadline(s) contained in Section III. However, it is incumbent upon the city to make a written request for such an extension. The request shall include as a minimum the following items:

- Provide the DEQ with a written notice describing the delay and identifying the specific deadlines that will not be met.
- Make a request for an extension of the deadline (length) and specific date on which the obligation will be met.
- Discuss measure(s) to minimize the delay.

The DEQ is aware of the financial issues that face the city and that this situation will complicate matters when attempting to propose a new compliance date.

It is important to make all attempts to maintain compliance with the Consent Agreement. The request for an extension is the next step to help ensure this, and will also help to avoid penalties as described in Section IV.

Attachment : Consent Order

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER AND RADIOLOGICAL PROTECTION DIVISION

In the matter of City of Flint municipal water system

Order No. P-99009
WSSN: 2310

/

CONSENT ORDER

The City of Flint ("City") and the Michigan Department of Environmental Quality ("MDEQ") agree to the following terms.

I. BACKGROUND RECITALS

1.1 The MDEQ has the authority to enforce the Michigan Safe Drinking Water Act, 1976 PA 399, as amended, MCL 325.1001 et seq.; MSA 14.427 (1) et seq.; and administrative rules promulgated thereunder, Michigan Administrative Code 1995 AACS R325.10101 et seq.; (hereinafter referred to as the Act).

1.2 The City operates a community water system to serve the citizens of the City of Flint and other customers. The City purchases water from the Detroit Water and Sewerage Department through a single pipeline. In the event of a failure of the pipeline or other extended interruption in supply from the pipeline, the City would need to use the existing standby facilities.

1.3 The MDEQ, its Director, and his authorized designee and City are authorized under Section 15 (MCL 325.1015) and Section 16 (MCL 325.1016) of the Act, Administrative Rule 325.10208, and Section 78(2) of the Administrative Procedures Act (MCL 24.278(2)) to enter into, comply with, and enforce the positions of this Consent Order. The MDEQ acknowledges that this enforcement action embodied by this Consent Order entitles the City to an additional twenty-five (25) points under Section 5406 of the Safe Drinking Water Assistance Act (MCL 324.5406).

1.4 This Consent Order shall be considered a Final Order of the MDEQ, and shall become effective on the date it is signed by the Chief of the Drinking Water and Radiological Protection Division (DWRPD), designee of the MDEQ Director.

1.5 The City agrees to fully comply with all provisions of the Act, its Administrative Rules, and this Consent Order. The City and the MDEQ acknowledge that the signing of this Consent Order is to provide for the renovation of the Flint Water Treatment Plant (the "Facility"), according to the terms and schedule set forth herein.

In this regard, the City has submitted a project plan to the MDEQ for the purpose of obtaining funding under the Drinking Water Revolving Fund (DWRF) program. Furthermore, the rehabilitation of the Facility as described by the approved project plan will assure the City an adequate and reliable supply of drinking water on a continuous basis. The MDEQ acknowledges that the project set forth in the project plan fulfills the reliability requirements of the Act.

II. EXTENSIONS

2.1 The City and the MDEQ agree that the Chief of the DWRPD may, at his sole discretion, grant the City an extension of the specified deadlines set forth in this Consent Order. Any extension shall be preceded by a timely written request, received by the MDEQ no later than forty five (45) business days prior to the pertinent deadline, which shall include:

(a) An identification of the specific deadlines(s) of this Consent Order that will not be met.

(b) A detailed description of what will prevent the City from meeting the deadline(s).

(c) A description of the measures the City has taken and/or intends to take to meet the required deadline.

(d) The length of the extension requested and the specific date on which the obligation will be met.

The Chief of the DWRPD shall respond promptly to such requests.

2.2 No formal advice, guidance, suggestions, or comments by the MDEQ regarding reports, work plans, plans, specifications, schedules, or any other writing submitted by the City will be construed as relieving the City of its obligation to obtain written extensions under this Consent Order, unless such extensions are specifically waived in writing by the MDEQ.

III. COMPLIANCE PROGRAM

3.1 Except as provided elsewhere in this Consent Order, the City agrees to renovate the Facility according to the following schedule (although it may proceed more quickly if the City so chooses):

(a) 1999: Electrical maintenance facility, operations center, boiler facility, distribution SCADA system, dual electrical service, rapid mix facilities, flocculation facilities, and interconnection structure.

Issuance of construction permit July 1, 1999
Notice to proceed September 21, 1999
Segment construction completed by December 22, 2000

(b) 2000: [redacted] flume rehabilitation and chemical feed systems.

Issuance of construction permit June 30, 2000
Notice to proceed September 21, 2000
Segment construction completed by December 22, 2001

(c) 2001: Filter rehabilitation, electrical rehabilitation including primary substation switchgear and pump station #4 motor control centers.

Issuance of construction permit June 30, 2001
Notice to proceed September 21, 2001
Segment construction completed by December 22, 2002

(d) 2002: Upflow softening basins, recarbonation facilities, treatment processes SCADA system and residuals treatment.

Issuance of construction permit June 30, 2002
Notice to proceed September 21, 2002
Segment construction completed December 22, 2003

(e) 2003: Ozone facilities, raw water pumping improvements and site improvements.

Issuance of construction permit June 30, 2003
Notice to proceed September 21, 2003
Segment construction and any remaining items from previous years complected by December 22, 2004

The City reserves the right to remove items from the compliance program that the Michigan Department of Environmental Quality determines are unnecessary or that are not necessary to protect public health through adequate treatment of water for drinking and household purposes.

3.2 The City shall provide third party construction certification by a registered professional engineer when project segments have been completed in accordance with the approved plans.

IV. SETTLEMENT OF VIOLATIONS

4.1 For each failure to comply with the provisions of Section III, Compliance Program, of this Consent Order, the City shall be given thirty (30) days in which to correct the violation without incurring a stipulated penalty. Thereafter, the City shall pay to the State of Michigan the sum of $100 per violation per day for thirty-one (31) to ninety (90) days of violation, and $500 per violation per day for each day of violation thereafter. Payments shall be paid within thirty (30) days after a written demand is made by the MDEQ.

4.2 The City shall make the payments set forth above by certified or cashier's check made payable to the "State of Michigan" and mailed to the MDEQ, Revenue Control Unit, P.O. Box 30657, 300 South Washington Square, Suite 457, Lansing, Michigan 48909-8157. To ensure proper credit, all payments made pursuant to this Stipulation should include Payment Identification Number DWD _____.

V. DISPUTE RESOLUTION

5.1 Any dispute that arises under this Consent Order shall initially be the subject of informal negotiations between the parties. The period for informal negotiations shall end when the MDEQ provides a written statement setting forth its proposed resolution of the dispute to the City. The City and the MDEQ agree that the informal negotiation period tolls any statute of limitation or other judicial or administrative court filing period of limitation regarding items particularly in dispute.

VI. FORCE MAJEURE

6.1 The City shall perform the requirements of this Consent Order within the time limits established herein, unless performance is prevented or delayed by events which constitute a "Force Majeure." Any delay in the performance attributable to a "Force Majeure" shall not be deemed a violation of the City's obligations under this Consent Order. Furthermore, payments under Section IV, Settlement of Violations, shall not accrue during any period that constitutes "Force Majeure."

6.2 For the purpose of this Consent Order, "Force Majeure" means an occurrence or nonoccurrence arising from causes beyond the control of and without the fault of the City, such as: an Act of God; untimely review of permit applications or submissions by the MDEQ or other applicable authority; and acts or omissions of third parties that could not have been avoided or overcome by the City's diligence, that delay the City's performance of an obligation under this Consent Order.

6.3 "Force Majeure" does not include, among other things, unanticipated or increased costs, or changed financial circumstances, except as set forth in Section VII, Available Funding, of this Consent Decree.

6.4 The City shall notify the MDEQ, DWRPD Supervising District Engineer in Morrice by telephone at 517-625-4682, within forty-eight (48) hours of discovering any Force Majeure event, which causes a delay in its compliance with any provision of this Stipulation. Written notice shall be submitted withing ten (10) calendar days and shall describe in detail the anticipated length of delay, the precise cause or causes of delay, and the measures taken by the City to prevent or minimize the delay. The City shall adopt all reasonable measures to avoid or minimize any such delay.

6.5 If the parties agree that the delay or anticipated delay was beyond the control of the City, the parties may agree upon an appropriate modification to this Consent Order. The burden of proving that any delay was beyond the reasonable control of the City, and that the City has met all the requirements of this Section, is on the City.

6.6 An extension of one (1) compliance date based upon a Force Majeure event does not qualify the City for an extension of subsequent compliance dates, unless the parties agree that subsequent activities and compliance dates are dependant on completion of prior activities.

VII. AVAILABLE FUNDING

7.1 The City and MDEQ agree that the City's obligation to meet the schedule of activities set forth in Section III, Compliance Program, is contingent upon the City having accumulated total DWRF super-priority funding in at least the following amounts by the following years:

(a) 1999: $4,000,000
(b) 2000: $10,000,000
(c) 2001: $16,000,000
(d) 2002: $22,000,000

However, the City shall only be excused under this paragraph if the City has made a good faith attempt to receive DWRF funding in each year stated above. In the event that the City does not receive and accumulate DWRF funding in at least any of the above-stated amounts, then the MDEQ and the City shall renegotiate the schedule contained in Section III of this Consent Order, although the City shall not be excused from performing the activities set forth therein. The City acknowledges

that the above-stated amounts are not meant to cover the full cost of the contemplated Facility rehabilitation and that it is the City's responsibility to cover such additional amounts.

VIII. GENERAL PROVISIONS

8.1 With respect to any violations not specifically addressed and resolved by this Consent Order, the MDEQ reserves the right to pursue any other remedies to which they are entitled for any failure on the part of the City to comply with the requirements of the Act and its Administrative Rules.

8.2 Notwithstanding any other provision of this Consent Order, an enforcement action may be brought by the MDEQ pursuant to the Act, its Administrative Rules, or other statutory authority where the City may present an imminent and substantial hazard to the public health or to the environment or is endangering or causing damage to the pubic health or the environment.

8.3 This Consent Order in no way affects the City's responsibility to comply with any other applicable state, federal, or local laws or regulations.

8.4 Nothing in this Consent Order shall be construed as an admission of liability or serve as an admission of any fact in any judicial court or administrative court on the part of the City.

IX. TERMINATION

9.1 Except as provided elsewhere in the Consent Order, this Consent Order shall remain in full force and effect until expressly terminated by a written Notice of Termination issued by the Chief of the DWRPD. The City may request that the Chief issue a written Notice of Termination at any time after achieving compliance with this Consent Order. Such a request shall consist of a written certification that the City has fully complied with all of the requirements of this Consent Order. Specifically, this certification shall include:

(a) The date of completion of each segment of the compliance program in Section III; and

(b) A statement that all required information has been reported to the Supervising District Engineer.

The Chief of the DWRPD may also request additional relevant information.

SIGNATORIES

The undersigned certify that they are fully authorized by the party they represent to enter into and execute this Consent Order and to legally bind that party to it, that they have executed this Consent Order solely upon their own judgment and that they have read and fully understand the content and legal consequences of this Consent Order.

City of Flint

Woodrow Stanley, Mayor
City of Flint
Date: August ___, 1999

Michigan Department of Environmental Quality
Russell J. Harding
Director

Flint C. Watt, P.E., Chief
Drinking Water and Radiological
Protection Division
Date: August 31, 1999

Inez M. Brown, City Clerk

APPROVED AS TO FORM:

Karen McDonald Lopez
Chief Legal Officer

APPROVED AS TO FINANCES:

Matthew A. Grady III
Director of Finance

APPROVED AS TO EEO/CONTRACT COMPLIANCE:

Charles Winfrey
EEO/Contract Compliance Officer

94111C

ADOPTED: AUG 9 1999

08/12/1999 cc: Mike Kovach
Tim Benton

DWRF

Resolution Authorizing Entry into Consent Order With Michigan Department of Environmental Quality

BY THE MAYOR:

Pursuant to its authority under the Michigan Safe Drinking Water Act, 1976 PA 399, as amended, MCL 325.1001 et seq.; MSA 14 427(1) et seq, the Michigan Department of Environmental Quality (MDEQ) has requested that the City renovate the Flint Water Treatment Plant, so as to ensure the Water Plant will continue to provide a reliable source of water in the event of a failure or extended interruption in the water pipeline from Detroit

The City and MDEQ have negotiated a Consent Order, see attached, whereby the City has agreed to a schedule for renovations of the Water Plant. In exchange for its commitment to the schedule, the City shall receive an additional twenty-five (25) points under the Safe Drinking Water Assistance Act.

The City's obligation to meet the schedule of activities set forth in the Consent Order is contingent upon the City having accumulated total Safe Drinking Water Assistance Act revolving fund super-priority during the years 1999 – 2002.

Further, in the event the City is not awarded funding under Safe Drinking Water Assistance Act during years 1999 – 2002 of the Consent Order, the schedule for renovations is re-negotiable.

RESOLVED, that the appropriate City Officials are hereby authorized to enter into the above described Consent Order with MDEQ A project will be established for matching estimated revenue and appropriations.

APPROVED AS TO FORM:

Karen M Lopez

Karen McDonald Lopez
Chief Legal Officer
Date: 8-5-99

APPROVED BY
CITY COUNCIL

AUG - 9 1999

Reviewed by Budget:

Matthew A. Grady III
Date: 8/5/99

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Status Report
City of Flint
Water Distribution System

November 25, 2002

Prepared By: Michael F. Prysby, P.E.
District Engineer
Water Division
DEQ – Shiawassee District Office

On November 18, 2002, a meeting was held at the Flint Water Treatment Plant between Mr. Robert Carlyon, Mr. Jeff Bryson, Mr. Michael Brown, Mr. Glen Thomas, and staff of the Department of Environmental Quality (DEQ). The purpose was to review the status of the more critical items from the city's water system 2000 Sanitary Survey. The amount of progress made in the areas discussed will help to determine whether an improvement in Flint's overall water system rating shall apply. Specific items are listed and discussed below in more detail:

1. The City of Flint has made significant improvements with their Cross Connection Control Program (CCCP). Based upon the July 12, 2002, letter from the city and our most recent discussion, routine inspections have resumed. A total of 376 higher priority accounts (those having reduced pressure zone, RPZ, backflow preventer devices) have been identified, and over 70% have complied with the testing requirement for this year. Routine inspections are being conducted at least once a year at these locations. Also, routine inspections have commenced among the lower priority accounts (4,160 total). The city intends to inspect these locations at least once every two to three years. This inspection frequency is acceptable, however, it appears that an additional part-time position will be needed to accomplish this.

   The Utilities Department will propose a new fee schedule associated with the CCCP that will allow for additional staffing to fully implement the program. We would encourage the city to approve the new fee schedule as this will assist the Utilities Department in adequately implementing the CCCP.

   Flint's CCCP's is now rated marginal. Additional program elements are needed in order for the program to obtain a satisfactory rating and are listed below:

   - Update the city's most recent CCCP (1989 revision). It may be worthwhile to reference Appendix B – "Outline of Local Program" in our Cross Connection Rules manual when updating the city's program. Please provide us with a draft copy of the updated program for our review and comment.
   - Submit a report detailing accomplishments made in 2002, and what is expected to be accomplished during 2003.
   - Achieve the necessary staffing to complete the minimum number of routine inspections.

2. Operator certification (distribution) has also improved since the time of our survey. This is evidenced by the increased number of exam applicants pursuing S-4 and S-3 licenses. The S-3 and S-4 license is now required by the city for the Water Construction Equipment Operator (Level 19) and the Water Distribution Maintainer

(Level 18) positions and will be incorporated into the job description. Finally, the city may require their meter reading staff to obtain the S-5 license.

It is evident that more attention is being given towards operator certification. The city needs to continue to encourage and promote operator certification among the Utility Department operators who are involved in water system activities.

Please submit a copy of the new employee organizational chart for the Utilities Department.

3. The DLZ Michigan, Inc. hydraulic model is essentially complete with the exception of resolving several inconsistencies noted in various locations. DLZ will assist in training the Utilities Department staff on using the model for verifying hydraulic improvements, input of hydrant and valve information, and generation of system plans and maps.

   Our main concern with the Flint water distribution system continues to rest with the condition of the piping network. Many mains are in poor condition and in need of replacement. Due to budget constraints, the city has not preceded with the suggested Capital Improvements Program (CIP) for watermain replacement. It appears that 2004 may the earliest in which the city may initiate a CIP for watermain replacement.

   A new water rate schedule is anticipated and will play a role in determining the timing of the CIP and the amount of main that can be replaced on a yearly basis. Some additional local block grant funding may allow the city to complete additional improvements. The city must prepare a revised CIP for watermain replacement after the new rate schedule is established.

4. Certain segments of Flint's water utility's O&M programs remain in need of improvement and are attributed to an insufficient amount of time, and/or number of qualified operators being committed to various program activities. Of greatest concern is the city's deficient valve program. The Utilities Department will be making a request for additional staffing to address this deficiency. The possibility of retaining a private contractor for valve exercising is also being looked into. The city needs to review the workload and determine the workforce needed by the Utilities Department to improve this program. Any additional positions that are needed should be approved and filled.

   Next, the city has replaced the majority of it residential meters with radio read meters and will proceed in replacing commercial accounts with radio reads next year. This constitutes an improvement as it will allow the department to conduct meter reads in a shorter amount of time.

   Finally, the Utility Department discontinued chlorination earlier this year at both the Cedar Street and Westside booster pumping stations. Distribution system chlorine residual levels, however, have not been negatively impacted.

5. The Booster Pumping Station Master Plan discussed during our 2000 survey has not been prepared. However, some station improvements were completed. This

included installing new transformers and incoming electrical service at the Cedar Street Pump Station along with replacing the cone valves with power check valves for the second pump. Also, the roof at the Cedar Street facility was replaced.

There are other items that remain to be completed. These include: upgrading the switchgear at the Cedar Street Pump Station; replacing the swing check valves on the smaller pumps at the Westside Pump Station; and completing pumping modifications at the Torrey Road Pump Station. We would like to hear from the city as to when these improvements can be scheduled.

6. The Watermain Plan Review Procedure submitted to us last July has been revised. Please provide us with a copy of the updated procedure.

7. We have not received an updated water system Contingency Plan that addresses other potential distribution system emergencies, in addition to the failure of the 72-inch pipeline. Such emergencies could include a bacteriological contamination episode, a large main break, a significant backflow incident, or (as previously discussed) a loss of water pressure within the Flint distribution system. The revised plan needs to outline the mitigation procedures of these potential emergencies. It was mentioned that the Genesee County Emergency Coordination would be utilized during a water-related emergency. Please send us a copy of this program and/or document describing the procedure(s) that would be followed for our review and comment.

   Next, we did not receive discussion (as part of the Contingency Plan) outlining a suggested protocol in the event of an emergency repair of the 72-inch pipeline within Genesee County. This needs to involve coordination among all parties (Utilities Department staff, City of Flint, Genesee County Drain Commissioner, and Detroit Water and Sewerage Department officials) as to who will conduct the repair. The availability of repair parts must also be ascertained.

   Finally, it is our understanding that the city has accepted a grant from the U.S. EPA for a vulnerability assessment which will also require having an adequate emergency response plan in place. Your department will also need to address water system security measures as part of the assessment and these issues should be summarized in the Contingency Plan. As we discussed, we would be willing to meet with you to review Contingency Planning in more detail and provide further technical assistance.

The city has completed improvements in certain programs and has taken administrative steps towards addressing others. The water rate study (recently awarded) should recommend a new water rate structure to adequately address the needs of the Flint water system. City administration needs to adjust the water rate accordingly in order to allow a budget that promotes on-going capital improvements and improved operation.

In addition, the city has re-implemented the Cross Connection Control Program and has taken steps towards addressing operator certification, however, other critical water system improvements are needed. Therefore, the overall rating for the distribution system shall remain at "Deficient." In order to improve the rating, significant progress

towards addressing Items #3, #4, and #7 are needed. We will plan to re-evaluate Flint's water system again in 2003.

Status Report – Facility Inspection **November 25, 2002**
City of Flint
Wastewater Treatment Plant (WWTP)
National Pollutant Discharge Elimination System (NPDES) Permit No. MI0022926

Prepared By: Charles M. Bennett, P.E.
Environmental Engineer
Water Division
DEQ – Shiawassee District Office

On November 13, 2002, staff of the Department of Environmental Quality (DEQ), Water Division (WD) visited the City of Flint WWTP for the purpose of conducting an inspection of the facility relative to the referenced discharge permit. Mr. Mark Fulks, P.E., Flint Water Pollution Control (WPC) Facilities Engineer, discussed the facility operation with Mr. Charles Bennett of the WD, then led a tour of the plant. Mr. Bennett later met with Mr. Robert Case, WPC Supervisor, and Mr. Fulks to discuss the facility operation in greater detail.

Given the city's current financial situation, our department was concerned that operation and maintenance (O&M) activity at the WWTP could be compromised. Mr. Case indicated that although operation has been difficult the past few months, the WWTP budget has been restored, and money designated for sewer operation is now available for use. The ash lagoon outfall elimination project is now scheduled to begin, and at least two significant O&M projects: the NW Pump Station (PS) Interceptor, and the 3rd Avenue PS repairs will move forward.

The inspection included the incinerator building where repair of a sludge-cake conveyor system was underway due to fire damage. A parallel conveyor system was in operation and sludge incineration was proceeding normally.

There was a strong odor emanating from the grit handling building. Mr. Fulks indicated that the grit containers had not been emptied for some time since it had not rained recently. While we realize that the greatest accumulation of grit occurs during and immediately following rain events, due to scouring of the collection system, grit containers must still be emptied on a regular basis to minimize odor. We recommend emptying grit containment on a regularly scheduled basis rather than only when the containers become full.

All aspects of security at the WWTP should be examined and hardened. We noted that the dechlorination building was unlocked, and a one-ton cylinder was stored outside the building. Also, the WWTP and Genesee County Drain Commissioner (GCDC) share a common entrance on Beecher Road. This gate is open and unattended during business hours. We recommend the city work with the GCDC to strengthen this and other common security weaknesses.

There are housekeeping needs at the plant which are currently not being addressed. Grounds are poorly tended and many building areas are unkempt. Although these things may not directly affect water quality, our experience suggests that pride develops in having well-maintained facilities, which in turn tends to enhance job satisfaction and improve the quality of plant operation.

It was mentioned that approximately 12 operators at the plant need hazardous waste operations (HAZWOPER) training. Please review all personnel training needs and update as appropriate.

The Flint WWTP continues to operate at a lower than normal capacity due in part to the Buick City closure. We understand that the city had previously discussed with the GCDC the

possibility of selling some available treatment capacity to Genesee County. Please provide an update on the status of those negotiations.

The permit issued September 29, 2000, has been contested by the city and stayed by the Administrative Law Judge. Therefore, the facility operates under the conditions of the former permit, issued October 3, 1988. At the time of the inspection, the effluent was clear and the facility appeared to be in substantial compliance with the permit.

Status Report
City of Flint
Industrial Pretreatment Program

November 22, 2002

Prepared By: Carla Davidson
Environmental Quality Analyst
Water Division
DEQ – Shiawassee District Office

This report is written to describe the status of the City of Flint's Industrial Pretreatment Program (IPP). Please see the attached District Compliance Agreement (DCA), dated October 14, 2002, which details the outstanding items of noncompliance. The DCA was developed in response to continued noncompliance with state and federal pretreatment requirements verified during a Pretreatment Compliance Inspection (PCI) conducted on August 29, 2002.

To date, the City of Flint has submitted a revised Sewer Use Ordinance (SUO) and attorney certification requested in item 4 by the due date. The SUO includes enforceable local limits as required under Administrative Consent Order ACO-SW99-013 (ACO). The SUO has not yet been fully reviewed to ascertain if it is approvable. The attorney certification is acceptable as submitted.

Please note that significant city resources will need to be devoted towards completing the actions specified in the DCA. Successful completion of these tasks will require maintaining sufficient staffing levels (retaining a minimum of 4.4 FTE IPP employees) and resources. Failure to comply with the DCA may result in further enforcement actions.

Attachment
District Compliance Agreement

City of Flint
Evaluation Update
11/18/2002

1. **Organizational Structure & Operator Certification**

Water Dist Div (WDD) - 26 employees

OIC – Level 28 (S-1?)

Level 22A (forman levels) S-2s - three-four positions

Levels 12, 18, & 19 – trainee, maintainer, equip op – Status of certs -

How has the organizational structure changed? New chart available?

Is the city promoting operator cert. for the entry level positions?

Status of Mike Brown's cert? S-3 re-activated? Pursuing S-1?

2. **Transmission/Distribution**

Hydraulic model final calibration - training of staff – Status?

Updating of General Plan? Obtain from model?

Utilities Dept CIP – whats on tap for 03? 04? Copy avail?

MDOT projects on hold- Status?

3. **Pumping Stations & Storage**

3 MGAL reservoir - ~~venting and overflow determination made?~~

Master Plan for updating operating components of pumping stations – Status?

- Pump control at Westside
- Valving replacement at Cedar Street – Status
- Electrical upgrade at Cedar Street – Status?
- Roof replacement at Cedar Street – Status?
- Pumping modifications at Torrey Road – Status?

Rate Study

Contract w/ DBSH changes set
completed by E 2003
Res - comm. - incl. wholesale rates
designed to have a Rate structure
OEMs / Debt Ratio / equip repl / CIP
submittal 7/5 of data

Budget still will submit to Adm.

Table of Org. — Based on what we need
for new employees (roles, hrd this)
↳ technical manpower

300K — Block Grants for [redacted] Coping
Employing

Status of CL2 and flow monitoring at P.S. (via new SCADA)?

Status of CL2 feed at the P.S.?

4. **Hydrants & Valves**

Data tech. position for hydraulic. model and data input – Status?

Contract(s) for valve exercising on the horizon?

5. **CCCP - Status of program**

Staffing - Glenn Thomas, Jackie Hart (recordkeeping)

Program – Glen is to update 1989 program – status?

Ordinance - Ord. #3267 is being used

Communication – insp. @ food service accts & corr. With LHD to avoid overlap - Status?

Accounts - 343 total (1,400 devices) and inspecting 1/2yrs as per our 7/02 visit. Current status? How many were inspected in 02? How many high hazard accts were inspected in 02? Annual report for 02…

Rate schedule was to be looked at - status?

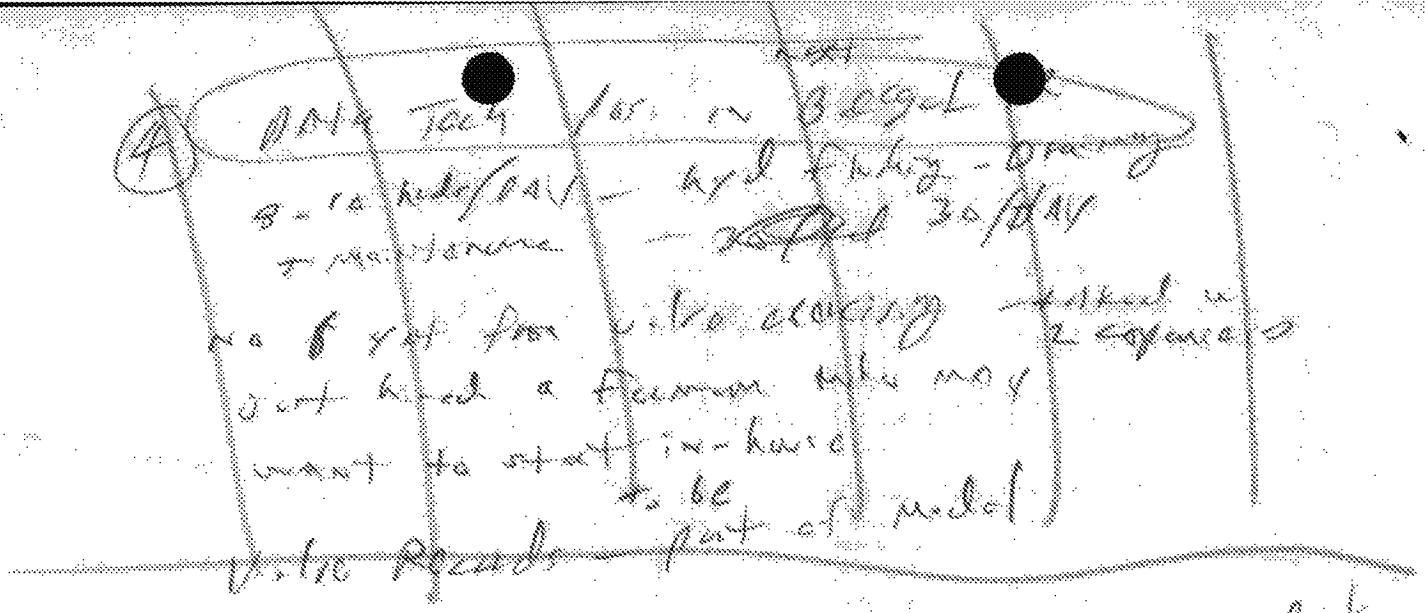
6. **Watermain Review Procedure - approved policy (July 02)**

Staffing change and/or re-structuring affecting the policy?
Any needs for revision?

7. **Contingency Planning**

Provision of water to Genesee County – Status of negotiations?

Plan in place for internal emergency? - format left with WDD



- Service @ Admin. We have a need to temperature gun Pigs (Staff person) to report efforts recorded in the survey

- Some served int Fa Reg-O U.S. Act 233 authority = partners - 6.0.8 for it if city were to become a con. - Ben 6.0.8 grant

*** 8. Segment 4 Construction Status**

How is the city planning to address the delay or possible loss of DWRF funding for Segment 4 construction in order to stay in compliance with the Consent Order?

We haven't heard back from the city (as required in the Consent Order)....

Is the city considering to provide?

- **Written notice describing delay...**
- **Request for an extension...**
- **Discussion of measures to minimize the delay...**

talk to Ed

he's not funding anything for Segg 4
until approval by the State

Reqm to Eliminate to be set on 2nd QTR
schedule

off Rec
city for 45 mill in unrestr. Rev. shortfall for MI
" has a 28 mill deficit
Budget shortfall Rev. shortfall in unrestr. as collateral for
Set 1-3 — Pledged as collateral
as collateral
would have nearly enough Rev. shortfall to
back as collateral Segg 4 & 5
- as know Egnr to back Segg 4 & 5
2 - 10 mill quicker
closing with the State Rev. shortfall
to commit the 10 mill.
city failed for low int. Bond
but got state

FY 03 negative to get (more) to support investment goals money to fund

But don't because

1. Evil — stock & from water/sewer funds gone

2. ... to get for-bond must show
   - audit shows bleeding stopped
   - a strategic budget adopted can be brought in

∴ 2 years out (from now)

new life study

B1C Budget

Bottom line — Ed knits / DARNell call/

Tim/Jim — talk discuss

Sept. AHR — Ed knits DARNell

cc: BOB

Attach the copy of Consent Order & highlight the schedules & ext.

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
SHIAWASSEE DISTRICT OFFICE

JOHN ENGLER
GOVERNOR

RUSSELL J. HARDING
DIRECTOR

October 14, 2002

IN THE MATTER OF:

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY// AND THE CITY OF FLINT//	**DISTRICT COMPLIANCE AGREEMENT** **NPDES Permit No. MI0022926**

On August 29, 2002, staff from the Surface Water Quality Division (SWQD), Michigan Department of Environmental Quality (MDEQ) conducted a Pretreatment Compliance Inspection (PCI) at the City of Flint (the City) Wastewater Pollution Control Facility. The MDEQ alleges that the City continues to be in noncompliance with the terms and conditions of Part I.C., Federal Industrial Pretreatment Program (FIPP) National Pollutant Discharge Elimination System (NPDES) Permit No. MI0022926, issued on October 3, 1988, which states that the permittee shall comply with Rules 323.2301 through 323.2317 of the Michigan Administrative Code (Part 23 Rules), the General Pretreatment Regulations for Existing and New Sources of Pollution (40 CFR Part 403), and the approved FIPP. The MDEQ alleges that the City continues to fail to adequately implement the requirements of its approved IPP, and that the City is in noncompliance with state and FIPP requirements.

MDEQ's letter dated September 6, 2002, alleged that the City failed to adequately implement its Enforcement Response Plan (ERP), provide adequate staffing to implement the approved FIPP, reissue permits for significant industrial users (SIUs) within 180 days of expiration, and bring nondomestic users into compliance. In addition, the MDEQ alleged that the City did not meet the requirements of NOV 12 01 01 001 L within the required timeframes, and has not yet submitted a final Sewer Use Ordinance (SUO) and attorney certification for final MDEQ approval.

In response to the allegations made by the MDEQ, the City and the MDEQ agree to the following course of action, with the explicit understanding that the City does not offer or imply any acceptance of these allegations by entering into this agreement:

1. The City hereby agrees that it shall take timely enforcement action as described in its 1993 Enforcement Response Plan (ERP), after properly verifying noncompliance and identifying a suspected perpetrator.

2. The City hereby agrees that it shall take timely enforcement action as described in its proposed ERP after properly verifying noncompliance and identifying a suspected perpetrator. This commitment shall be effective immediately after final MDEQ approval of the proposed ERP and the effective date of the City's proposed SUO following its enactment.

3. The City hereby agrees that it shall establish Special Alternative Limits for benzene, toluene, ethyl benzene, and xylenes in the sanitary sewer use permits for Lockhart Chemical and Oil Chem, Inc., in accordance with the procedures in its proposed SUO, within 30 business days of the effective date of the SUO following enactment.

4. By **October 15, 2002**, the City hereby agrees to submit an approvable, final revised draft of its proposed SUO, along with an attorney certification, regarding its legal enforceability, to the MDEQ for its review.

5. By **November 30, 2002**, the City hereby agrees to provide documentation to the MDEQ of its review and response to the following items submitted to the City on August 29, 2002 by Lockhart Chemical, as required under Part III.A of Lockhart Chemical's sanitary sewer use permit:

   a. Precipitation Runoff Report;
   b. Map of its facility and wastewater collection and drainage systems; and
   c. Slug Discharge Control Plan.

   The City shall respond by either approving the submittals or taking appropriate enforcement action to compel this company to achieve compliance with its permit.

6. By **November 30, 2002**, the City hereby agrees to provide documentation to the MDEQ of its review and response to the following items submitted to the City on August 21, 2002, by Oil Chem, as required under Part III.A of Oil Chem's sanitary sewer use permit:

   a. Precipitation Runoff Report;
   b. Map of its facility and wastewater collection and drainage systems; and
   c. Slug Discharge Control Plan.

   The City shall respond by either approving the submittals or taking appropriate enforcement action to compel this company to achieve compliance with its permit.

7. By **December 31, 2002**, the City hereby agrees to provide documentation to the MDEQ of its efforts to either cause Oil Chem, Inc., to stop diluting its centralized waste treatment wastewater with other wastewaters or establish fixed alternative limits, using the Combined Waste stream Formula, for the Oils Treatment and Recovery subcategory of the Centralized Waste Treatment category of industry in Oil Chem, Inc.'s sanitary sewer use permit.

8. By **December 31, 2002**, the City hereby agrees to provide documentation to the MDEQ of its efforts to bring Hurley Medical Center into compliance with its sanitary sewer use permit and Erwin Industries (formerly Plastics Research) into compliance with applicable sanitary sewer ordinances.

9. By **December 31, 2002**, the City hereby agrees to provide a written description to the MDEQ of its planned program for regulating restaurants whose sanitary sewer discharges plug receiving sewers.

10. By **December 31, 2002**, the City hereby agrees to submit to the MDEQ a letter either describing its efforts to fill the currently vacant Environmental Compliance Chemist position, in order to maintain an FIPP staffing level of at least 4.4 full-time equivalents, or confirming that this position has been filled.

11. By **December 31, 2002**, the City hereby agrees to provide written confirmation to the MDEQ that it has sampled and tested the discharges of SIUs regulated under applicable pretreatment standards for all relevant parameters at least once during 2002.

If the City will be unable to complete any action by a date agreed to herein, the City may request, with explanation, a mutually agreeable extension of the scheduled completion date by letter to MDEQ.

It is understood and agreed by the City and the MDEQ that compliance by the City with this agreement resolves the matters raised in the MDEQ letter, dated September 16, 2002, regarding its PCI conducted on August 29, 2002, and the MDEQ Notice of Violation 12 01 01 001 L.

Except as provided above, it is understood and agreed that compliance with this agreement does not constitute a release or waiver of liability for past or continuing violations of Part 31 of the Natural Resources and Environmental Protection Act, Act 451, PA 1994, as amended, or Part I. C., FIPP, NPDES Permit No. MI0022926, issued on October 3, 1988, which states that the permittee shall comply with Rules 323.2301 through 323.2317 of the Michigan Administrative Code (Part 23 Rules), the General Pretreatment Regulations for Existing and New Sources of Pollution (40 CFR Part 403), and the approved FIPP.

This agreement shall expire on **March 15, 2003.**

For the City of Flint

Signatories

GRC Carlyon 10/18/02

Date

G. Robert Carlyon, Director
Department of Utilities

For the Department of Environmental Quality

Timothy A Benton

Date

Timothy A. Benton, P.E., Supervisor
Water Division

Status Report **November 25, 2002**
City of Flint
Municipal Separate Storm Sewer (MS4) Permit

Prepared By: Cheryl Bartley
Environmental Quality Analyst
Water Division
DEQ – Shiawassee District Office

In 1992, the Federal Regulations began requiring permits for storm water discharges. As part of those regulations, municipalities with separate storm sewer systems which serve a population of 100,000 or more were required to obtain permit coverage.

The City of Flint was issued a National Pollutant Discharge Elimination System (NPDES) Permit (MI0053864) for the storm water discharges on January 29, 1996. This permit was reissued on September 26, 2001. Please review your permit for details regarding the requirements.

Upon reviewing our permit file, it has been noted that the City of Flint has missed a compliance date set forth in NPDES permit. Per Part I.C.1.b., of NPDES Permit No. MI0053864, the City of Flint was required to submit an annual report describing their progress towards compliance with the permit on or before October 1, 2002. In addition, the annual report shall include an approvable storm water management program plan.

The City of Flint is currently non-compliant with the terms and conditions of NPDES Permit No. MI0053864.

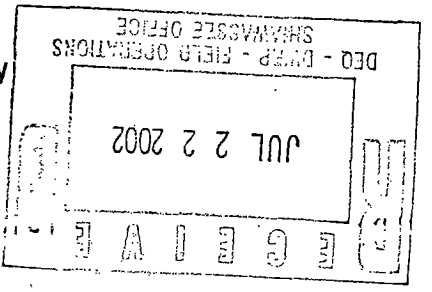
MEP

DEPARTMENT OF UTILITIES

Darnell Earley
Acting Mayor

G. Robert Carlyon
Interim Director

Mr. Timothy A. Benton, P.E.
Supervising District Engineer
Field Operations Section
Drinking Water & Radiological Protection Division
Shiawassee District, Michigan Department of Environmental Quality
10650 Bennett Drive
Morrice, Michigan 48857-9792



Subject: Flint Municipal Water System

Dear Mr. Benton;

In your letter to then City Administrator Darnell Earley dated July 11, 2001, you alleged that some areas of the City of Flint municipal water system were "clearly deficient and need immediate attention". As Interim Utilities Director for Flint, I feel that substantial progress has been made in eliminating those deficiencies and request that you review the information presented in this letter in order to set the record straight.

Addressing those three items in the order in which they were presented in your letter, I submit the following:

1. Water Main Review Procedure. The plan review and permit issuance policy for the City of Flint has recently been revised to reflect the recent departmental reorganization. Work continues on the hydraulic model, but hydrant flow tests necessary for final calibration cannot be conducted until the weather cools off and illegal hydrant usage declines. The City and DLZ continue to hold regular monthly progress meetings for this project and final delivery and training in the operation of the model is expected by fall. It continues to be my recommendation that the City avoid private ownership of water mains except under very unusual circumstances.
2. Source Reliability. Efforts by the City of Flint continue on schedule for the funding approval and construction of Phase I, Segment 4 of the Water Plant Rehabilitation utilizing the DWRF. Should no unforeseen problems occur, a contract should be finalized and construction activities commence in October/ November of this year. Real-time chlorine residual monitoring of the water distribution system is in place and will now be reported in the Monthly Operation Reports. Future issues regarding plant operation remain to be resolved. Likewise, the provision of water to Genesee County remains to be negotiated. At this point in time, the City has not received any such formal requests from the County.
3. Distribution system.
   - The Cross Connection Control Program has been transferred to the Utilities Department. Glenn Thomas, who is certified by the State as a cross connection inspector, a licensed plumber and a certified mechanical trades

inspector, heads the program. Mr. Thomas works out of the Utilities Department office. He recently sent you a letter describing the City's program of inspections and enforcement. I trust that you will find it satisfactory.

- Unfortunately, I am unable to report any significant progress regarding improved record keeping for the distribution system valves and hydrants. It is our intention to add a data technician position to the Water Service Center staff whose role will be to maintain and update the hydraulic model. The long-range plan is to incorporate valve and hydrant records into the model and its associated database. We are also investigating the possibility of contracting for valve exercising and data collection services. Budget constraints make it unlikely, however, that any such contract will be entered into this year.
- The Utilities Department has a Capital Improvement Plan (CIP). This plan is divided into four parts, representing the four divisions of the Utilities Department: Water Plant, Water Distribution, Sewer Maintenance and Water Pollution Control Plant. These plans will be updated annually and used to determine budgets and future water and sewer rates.
- Although continuing understaffing of the Water Distribution staff exists, the Administration has approved filling numerous vacant positions over the course of the next few months. Provisional appointments have already been made to fill the Construction Equipment Operator and Water Meter Tech Foreman positions. Full staffing is expected to be in place by the end of the calendar year. The current budget includes over $200,000 for equipment for the Water Distribution Division. Lease/Purchase agreements are being explored to maximize the number of vehicles that can be put to work during the current fiscal year with financing to extend over three years.
- Water Rates. The current water rate ordinance has been modified to remove the 8% cap on water rate increases in any given year. Proposals for conducting a water and sewer rate study have been received and evaluated. A recommendation has been sent to City Council and they are expected to act later this month. It is anticipated that this rate study will result in water and sewer rates that are based upon the actual expenditures incurred to provide for operation and maintenance of the systems, debt retirement, capital improvement programs and depreciation of facilities and equipment.

For these reasons, I would request that the "Deficient" rating given to the City of Flint's municipal water supply system be revised and that a letter indicating that revision be sent to the City at your first convenience. Should you require any additional documentation regarding the progress noted in this letter, please feel free to contact me at (810) 787-6537.

Yours truly,

GRC Carlyon

G. Robert Carlyon, Interim Utilities Director
City of Flint, Michigan

Xc: Darnell Earley, Acting Mayor

City of Flint
Routine Site Visit
7/1/2002

1. **Monthly Operation Reports**

   Chlorination @ Cedar St and Westside discontinued late Dec. 2000

   Resumed in March 2001 at Cedar Street
   Resumed in mid June at West Side

   Discontinued @ Cedar St. in late August 2001
   Discontinued @ West Side in December 2001

   *** Distribution residuals appear unchanged according to MORs**

   Flows in and out of reservoirs vary significantly on a daily basis....ranges? 0-700K

   West-Side: Summer operation (stratification) Chlorine being added? No
   ON Cl2 monitoring AS part of SCADA Seg 1
   West / Cedar Q also monitored + will be reported June 02

DBP Monitoring
No Untary

2. **Distribution System Projects (On hold)**

   MDOT projects on hold - clarification/refinement of plan review procedure
   - technical concerns

   Conformance with hydraulic model WS Central

   Draft plan review procedure (revised)

Randy Clapp Refine
Roger Gone Soon

3. **DBP Monitoring Requirements - see monitoring plan...**

   TTHM and HAA5 monitoring was to begin in 2002 - Quarterly monitoring

   4 samples (one @ max. residence time and 3 @ rep. sites)
   Approved DBPR monitoring plan
   No monitoring since chlorine boosting has stopped....

4. **CCCP - Status of program**

Bob Carlyon Int Utilities Director

Staffing - ~~Jacob Hawkins~~ Glenn Thomas FWSP

Jackie Hart

Program - ?

Ordinance - ?

Information – rules manual

- Hydro Designs Inc. 810 335-3122

Midwest Backflow Prevention 313 532 1964

343 letters RPZ accounts -

~1400 devices

all types 1/2 year

Will be looking at Rate schedule

City of Flint
Routine Site Visit
7/1/2002

1. **Monthly Operation Reports**

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   Flows in and out of reservoirs vary significantly on a daily basis....ranges?

   West-Side: Summer operation (stratification) Chlorine being added?

2. **Distribution System Projects (On hold)**

   MDOT projects on hold - clarification/refinement of plan review procedure
   - technical concerns

   Conformance with hydraulic model

   Draft plan review procedure (revised)

3. **DBP Monitoring Requirements - see monitoring plan...**

   TTHM and HAA5 monitoring was to begin in 2002 - Quarterly monitoring

   4 samples (one @ max. residence time and 3 @ rep. sites)
   Approved DBPR monitoring plan
   No monitoring since chlorine boosting has stopped....

— LAB Tech
— Maintainer
— WTP operator

Q2 Residuals sub. to DWSD?

(2) Can relocation policy from NDOT?

(Flint) We don't have a dist. model, GR will soon

(Flint) We does have a transp. model

(Mike Brown will have it)

4. **CCCP - Status of program**

Staffing - Jacob Hawkins, Glenn Thomas

Program - ?

Ordinance - ?

Information – rules manual
- Hydro Designs Inc. 810 335-3122
Midwest Backflow Prevention 313 532 1964

< 0.B Interns
White O.R
Jake HART - need kept "O

< 400 devices
→ 343 - Accts tested Now (one OR multiple devices)
LTRs went out → need for compl testing

Ord. 3267 ; re the one being used
Investigating Rate str. for (incorporate into the fee into

Prog → 1982 CCCP → Glenn to provide
any new prog. that is put together

Mike Brown - has ea 5-3 wants to get
credit to write 5-1 → needs 3-5 hrs
to get 5-3 back

Low HAZ
May want to talk w LHD on Fond Sauce Backflow
Lee — some ordinance may be compl - sink vac breaker
out perhaps not bakers tape to avoid overlap

Send us a Document that will also a letter

MFP Copy

DEPARTMENT OF UTILITIES

#2310

Darnell Earley
Acting Mayor

G. Robert Carlyon
Interim Director

TO: Melanie Purcell, Director
Building & Safety Inspections
Department of Community Development

Utilities Department Cost Center Managers

FROM: G. Robert Carlyon, Interim Director
Utilities Department

DATE: July 1, 2002

SUBJECT: Revised Policy

Please review the attached revision to the policy for water main construction plan review and permit issuance. Each of you have a responsibility to review plans for this work and to provide letters of recommendation regarding those aspects of the plan review process specific to your area of responsibility. Please complete your review and return a marked-up copy or a memo with your comments by July 10, 2002 so that the policy may be distributed in final form

Thank you for your cooperation in this matter.

Post-it® Fax Note 7671	Date 7/2	# of pages ▶
To TIM BENTON	From BOB CARLYON	
Co./Dept. MDEQ	Co.	
Phone #	Phone #	
Fax # 517 625 5050	Fax #	

LATEST REVISION

CITY HALL 1101 S. SAGINAW STREET FLINT, MICHIGAN 48502 (810) 766-7135 FAX: (810) 766-7249

07/02/02 07:01A P.001 810 787 3710 Int Water Plant

MFP

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
SHIAWASSEE DISTRICT OFFICE

JOHN ENGLER
GOVERNOR

RUSSELL J. HARDING
DIRECTOR

June 7, 2002

Mr. G. Robert Carlyon, Interim Utilities Director
City of Flint Water Plant
4500 North Dort Highway
Flint, Michigan 48505

WSSN: 2310

Dear Mr. Carlyon:

SUBJECT: City of Flint, Protocol for Water Main Approval

We have received a number of proposals from the city of Flint requesting a construction permit authorizing installation of water main in various locations. It was our understanding, based on our most recent discussion with you, that further water distribution and/or transmission main projects were on hold. Next, significant staffing changes within the various public works departments (Water Service Center, BSI, Water Treatment Plant, etc.) has resulted in a change in the city's protocol for reviewing and approving water main projects. A revised plan review procedure was recently submitted to us for review.

The revised plan review procedure continues to show two basic tracks and is satisfactory. However, some additional information concerning the city's review protocol is needed. Specifically, at what point in the city's review is the proposed project evaluated for conformance with the city's hydraulic network model. Who will be responsible for using the model to verify the hydraulic design for new projects?

Below is a list of projects submitted to us by the Transportation Department. These projects have been reviewed, and we are prepared to issue a construction permit following your approval and a response from the city pertaining to the items discussed above:

- 5th Avenue Water Main Replacement
- Pierson Road Water Main Replacement (MLK to Horton)
- Pierson Road Water Main Replacement (Fleming to Dupont)

Next, is a list of projects submitted to us by the Transportation Department in which our review reveals technical concerns, in addition to the issues discussed above, that need to be addressed prior to obtaining a construction permit:

- Ballenger Highway Water Main Replacement - inadequate number of isolation valves proposed at street intersections.

- Pierson Road Water Main Replacement (Dupont to MLK) – horizontal separation concerns from storm sewer from Station 19+58 to Glenn Avenue.
- MLK Water Main Replacement – cut and plug statements are needed for the tie-in mains at the intersections and the existing 12-inch main along MLK Avenue. There are also several vertical separation concerns with existing storm sewers in the vicinity of Damon Street, Gillespie Avenue, and Myrtle Avenue.

Finally, is the city intending to proceed with the six projects listed above or are they on hold?

If you have any questions regarding this issue or any other water related matter, please feel free to call me at the number listed below.

Sincerely,

Michael Prysby

Michael F. Prysby, P.E., District Engineer
Field Operations Section
Drinking Water and Radiological
Protection Division
517-625-4670

MFP:LW
cc: Mr. Hans Kulhman, Transportation Department, City of Flint
Mr. Brian McKenzie, Genesee County Health Department

From: Carol Freeman
To: dan_feinberg@levin.senate.gove
Date: 3/18/02 12:40PM
Subject: City of Flint, Water Main Improvement Projects

City of Flint

Water Main Improvement Projects:

The City of Flint is proposing to commence with the construction of several new water main projects in the 2002, replacing water lines that are over 75 years old and to provide potable drinking water for service to existing and new developments/ land use and for fire protection. The projects in order of priority are:

Hamilton Avenue between Saginaw St. and James P. Cole Blvd
Ballenger Hwy between Augusta and the City Limits
Pierson Rd between Fleming Rd and Horton
Fifth Avenue between Prospect St and Chippewa
M.L. King Avenue between Pasadena and Flint Park Blvd
Fenton Rd between Hemphill Rd and Atherton Rd
East Court Street between Dort Hwy and Averill Ave.
Flushing Rd between Prospect and Ballenger Hwy
Third Ave between Chevrolet Ave and Saginaw Street.

CC: Kuhlmann, Hans

FYI
This is the Flint Dist. Projects
that the City plans to boldly go
- also the Prairie Farm ...

MEMBER: City of Flint Flint STATE: MI
1101 S Saginaw St

PROJECT NAME:
HAMILTON AVENUE WATER MAIN

REQUESTED AMOUNT: Federal $550,000.00 Local $450,000.00

STAG SPECIAL PROJECTS INFORMATION

	YES/NO/ Information
1A. Is the proposed project eligible for a loan from its states Clean Water or Drinking Water State Revolving Fund? 1B. Have the potential grant recipients applied for an SRF loan? 1C. What priority ranking did the state assign to this project as the result of that application? 1D. If the community did apply for a loan, how large an SRF loan did the state determine potential grant recipients could afford to repay?	No No No No
2. How will the requested funds benefit low or moderate-income communities?	Provide reliable, continous potable drinking water supply. Existing water main is 75 yrs.old
3A. Will the requested funds be used for construction, not debt relief? 3B. Will this be a one-year request that will move a project into construction?	- Used for construction - To be used in current year.
4. What is the purpose of the project? Wastewater treatment or drinking water?	- Drinking water
5. What is the estimated average annual user fee as a percent of the estimated median annual income of households that will be served by the project if the community constructs the proposed project without the requested grant funds? with an SRF loan? with municipal funding at market rates?	Annual average cost of water per household is $456.00. Annual income is $10,000.00. %=4.6%.
6. What are the communitys plans for providing the expected 45% match?	Use of City Water Fund.
7. Does the project serve a broad public purpose or is it intended for a more limited (or private) purpose that could more appropriately be funded by a private party or local financing?	Serves to provide potable water to new housing and for fire fighting.
8. Does the project address an immediate need or is it predicated on future growth/development?	Existing water line is 75 yrs old. There is an immediate need.

Hamilton Ave. between N. Saginaw St & James P. Cole Pkwy.

- Replace 75 year old, deteriorating water line.
- Install a new 16 inch diameter water main and connections.
- Water main is important to serve existing and new land development.

MEMBER: _____ STATE:

_____

PROJECT NAME:

_____

REQUESTED AMOUNT: _____

STAG SPECIAL PROJECTS INFORMATION

	YES/NO/ Information
1A. Is the proposed project eligible for a loan from its states Clean Water or Drinking Water State Revolving Fund? 1B. Have the potential grant recipients applied for an SRF loan? 1C. What priority ranking did the state assign to this project as the result of that application? 1D. If the community did apply for a loan, how large an SRF loan did the state determine potential grant recipients could afford to repay?	
2. How will the requested funds benefit low or moderate-income communities?	
3A. Will the requested funds be used for construction, not debt relief? 3B. Will this be a one-year request that will move a project into construction?	
4. What is the purpose of the project? Wastewater treatment or drinking water?	
5. What is the estimated average annual user fee as a percent of the estimated median annual income of households that will be served by the project if the community constructs the proposed project without the requested grant funds? with an SRF loan? with municipal funding at market rates?	
6. What are the communitys plans for providing the expected 45% match?	
7. Does the project serve a broad public purpose or is it intended for a more limited (or private) purpose that could more appropriately be funded by a private party or local financing?	
8. Does the project address an immediate need or is it predicated on future growth/development?	

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
SHIAWASSEE DISTRICT OFFICE

JOHN ENGLER
GOVERNOR

RUSSELL J. HARDING
DIRECTOR

February 4, 2002

Mr. G. Robert Carlyon, Supervisor
City of Flint Water Treatment Plant
4500 North Dort Highway
Flint, Michigan 48505

Mr. Mark Horgan, P.E.
Genesee County Drain Commissioner
G-4610 Beecher Road
Flint, Michigan 48532

Dear Mr. Carlyon and Mr. Horgan:

SUBJECT: Richfield Township Water Main Extension
Transportation Service Center

We received a set of construction plans from the Michigan Department of Transportation (MDOT) for a water main extension along Potter Road that will serve a new MDOT building.

As we discussed, this project needs to be submitted to us through the Genesee County Drain Commissioner's office and be approved by the city of Flint prior to our issuance of a construction permit.

Finally, it is evident that there are issues pertaining to the location of the distribution main in proximity to the 72-inch transmission main along Potter Road. These issues need to be resolved and will likely require the establishment of a policy between Flint and Genesee County for water main extensions in this area. The policy should establish a procedure that will effectively address these issues for future projects.

If you have any questions regarding this or any other water-related matter, please don't hesitate to call me.

Sincerely,

Michael Prysby

Michael F. Prysby, P.E., District Engineer
Field Operations Section
Drinking Water and Radiological
Protection Division
517-625-4670

MFP:LW
cc: Mr. Brian McKenzie, Genesee County Health Department

STATE OF MICHIGAN

JOHN ENGLER, Governor

DEPARTMENT OF ENVIRONMENTAL QUALITY

"Better Service for a Better Environment"

HOLLISTER BUILDING, PO BOX 30473, LANSING MI 48909-7973

INTERNET: www.deq.state.mi.us

RUSSELL J. HARDING, Director

REPLY TO:

SHIAWASSEE DISTRICT OFFICE
10650 BENNETT DR
MORRICE MI 48857-9792

July 11, 2001

Mr. Darnell Earley, City Administrator
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502

WSSN: 2310

Dear Mr. Earley:

SUBJECT: Flint Municipal Water System

Over the last several years, the Drinking Water and Radiological Protection Division (DWRPD), of the Michigan Department of Environmental Quality, has been working very closely with city of Flint officials regarding the municipal water system. The efforts have included inspections of waterworks facilities, meetings with staff from different city departments, and written correspondence documenting our findings, conclusions, and recommendations.

This letter is a summary of the status of three main areas regarding water system operation and maintenance. Significant improvements have been made in some areas, but other areas of water system operation are clearly deficient and need immediate attention.

1. Water Main Plan Review Procedure. A procedure has been implemented for the review and approval, by the city engineer, of new or replacement water mains. The plans are then forwarded to the DWRPD for issuance of the required construction permit. This procedure became necessary because projects were being initiated by different city departments or from private developers, and coordination was needed to assure compliance with city and state requirements.

   In addition to this new review procedure, the city's standard specifications for laying water mains have been submitted for review and comment. Another design standard that the city needs to establish is that of fire flow requirements. The city needs to determine the level of fire protection that will be provided to its customers. Some communities have different standards for specific service areas, such as residential, commercial, and industrial. The hydraulic network model, to verify that a particular water main design will meet the city fire flow requirements, also needs to be completed. These are issues that the city needs to address so that all proposed projects meet city standards.

Another related issue is that of ownership of water mains. The city has previously allowed the installation of privately owned water lines. This is an issue that we have reviewed with staff without resolution. It is generally not in the city's best interest to allow privately owned water lines, but there are exceptions. This issue needs further discussion and perhaps a city policy.

2. Source Reliability. The rehabilitation of the water treatment plant is an extremely important project, and the city is to be commended for its progress. We have just recently issued the construction permit for the third segment of the proposed five-segment project. The plant will provide a back-up source of drinking water in the event of a failure of the primary supply pipeline.

   Other improvements at the plant have already improved operation of the overall system by upgrading the monitoring, and control of flows and pressures around the system.

   Future issues regarding the water plant include when and at what rate will the plant operate, and will it provide water to Genesee County. An engineering study of the pumping stations is also planned, but is on temporary hold due to the amount of time and effort required of staff for the plant rehabilitation project.

3. Distribution System. Despite progress in the first two areas, there are severe deficiencies within the distribution system facilities and operation. In March of 2000, we sent the city a complete evaluation of the distribution system called a "Sanitary Survey." In this document, we noted several areas where there were severe problems. We have met with staff on several subsequent occasions to review the issues, but adequate progress has not been made. The following is a list of the most serious concerns:

- Cross Connection Control Program. The program for controlling the potential for backflow of contaminants to the distribution system has essentially been discontinued. This represents a clear threat to the public health of your customers and must be addressed as soon as possible. The city's ordinance, program, and designated agent all need to be reviewed and updated.

- The records for the distribution system valves, hydrants, and meters are in need of attention. The valve records are in the worst condition with the city having records on only 1,500 valves out of a total of 8,000 to 10,000 valves in the system.

- The city does not have a "Capital Improvement Plan"(CIP). All well run municipal utilities need an on-going CIP to address infrastructure replacement or rehabilitation. The city experiences 300 – 600 water main breaks per year but there is no plan to replace aging, deteriorating water mains.

- Staffing and equipment needs at the Water Distribution Division need to be reviewed. The city cannot address its backlog of work without adequate personnel and quality equipment.

- Water Rates. The deficiencies noted pose an enormous threat to the city and its future. We understand that the city is going through financial difficulties, but the condition of the distribution system cannot be allowed to deteriorate further. A rate study should be performed without delay, and water rates raised to ensure that there are adequate dollars to run the system and address the problems.

Based on these problems, the city's distribution system has been given a **"Deficient"** rating. Once you have reviewed this letter and have had a chance to discuss the issues with staff, we would appreciate an opportunity to meet with you. If you have any questions, please call me.

Sincerely,

Timothy A. Benton, P.E.
Supervising District Engineer
Field Operations Section
Drinking Water and Radiological
Protection Division
517-625-4682

TAB:LW
cc: Mr. H. Jack Sargent, Director Department of Public Works
Mr. Hans Kuhlmann, Deputy Director/City Engineer, Dept of Public Works
Mr. G. Robert Carlyon, Water Plant Supervisor
Mr. Roger Clapp, Water Distribution Supervisor
Mr. Jacob Hawkins, Building and Safety Inspections
Mr. Brian McKenzie, Genesee County Health Department

MFP

STATE OF MICHIGAN

JOHN ENGLER, Governor

DEPARTMENT OF ENVIRONMENTAL QUALITY

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INTERNET: www.deq.state.mi.us

RUSSELL J. HARDING, Director

REPLY TO:

SHIAWASSEE DISTRICT OFFICE
10650 BENNETT DR
MORRICE MI 48857-9792

June 20, 2001

Mr. Hans Kuhlmann, P.E., Deputy Director/City Engineer WSSN: 2310
Department of Public Works & Utilities
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502

Dear Mr. Kuhlmann:

SUBJECT: Water Main Plan Review Policy

This will confirm our meeting of June 19, 2001, and our discussion of the comments and suggestions raised in our March 28, 2001, letter to you regarding this issue.

You indicated that some office names and/or titles would be included in the policy, and that the number of sets of plans to be submitted would also be clarified. In addition, the policy would be put on city letterhead and distributed to appropriate city departments, as well as local consultants.

Adherence to the plan review policy is required. Plans for water main extensions that are sent directly to us without the required approval by your office will be returned to the consultant.

Other important issues related to the installation of new water mains were also discussed and are summarized as follows:

1. The city needs to submit a set of standard water main specifications for review and approval. It is common for construction plans to note that all work shall comply with city standard specifications, however, we do not have your specifications on file. If the city needs to update its standard specifications, we would review a draft and offer comments if requested. It is important to keep city specs current due to changes in water main materials, construction techniques, revisions to American Water Works Standards, etc. For example, ductile iron pipe is now available as "standard pressure class" or "special thickness class," and city specs should reflect whether both are acceptable or if one type is required.

2. The city needs to compile other water main design standards as well. For instance, issues such as minimum pipe diameter (which we just received) and fire flow requirements need to be established. In most situations, fire flow requirements dictate hydraulic design. Therefore, we need to know the community's design standards. The level of fire protection to be provided typically varies from residential to commercial or industrial areas, and represents a significant cost issue.

3. The status of the city's hydraulic network model needs to be clarified. Which city office will be using the model to verify the hydraulic design for new projects? The model outputs should be available for review and discussion for new or replacement water mains. A

functional hydraulic network model is an extremely valuable tool for water system engineers, operators, and managers. We would like to know who at the city will be responsible for the model use and upkeep.

4. The city's lead service replacement policy was discussed. It was learned that when lead services are encountered, the city is replacing the city owned portion of the line from the main to the curb stop with copper. The portion of the service line from the curb stop to the building is the responsibility of the owner. The preparation of an official notification from the city to the owner regarding the work the city performed and recommendations for the owner was then discussed. This notice would also include the names of contractors approved by the city for service line installation. We would appreciate receiving confirmation of the city's policy and procedures for lead service lines.

5. The issue of customer site piping versus water main was briefly reviewed. Copies of our policy regarding this issue were left with you for your use. This issue needs to be addressed, but should be the subject of another meeting due to its complexity. However, as I indicated, if the city's degree of control over the privately owned lines is satisfactory, it would be possible to consider the lines to be water main. It should be noted again that allowing privately owned water lines or customer site piping is not in the city's best interest.

We look forward to receiving a copy of the final plan review policy, and to receive all future plans from your office with a cover letter requesting that a permit be issued. The cover letter will also verify that the plans are acceptable to the Water Distribution Division and meet all applicable city standards and specifications. As we noted previously, our typical review time is generally less than 10 days for most water main projects.

Regarding the other items, we also look forward to hearing from you as these items are prepared.

Sincerely,

Timothy A. Benton, P.E.
Supervising District Engineer
Field Operations Section
Drinking Water and Radiological
Protection Division
517-625-4682

TAB:lw
cc: Mr. Roger Clapp, City of Flint Water Service Center
Mr. H. Jack Sargent, P.E., City of Flint Director of Public Works & Utilities
Mr. G. Robert Carlyon, City of Flint Water Treatment Plant
Mr. Brian McKenzie, Genesee County Health Department

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RUSSELL J. HARDING, Director

REPLY TO:

SHIAWASSEE DISTRICT OFFICE
10650 BENNETT DR
MORRICE MI 48857-9792

March 28, 2001

Mr. Hans Kuhlmann, P.E., Acting Director
Department of Public Works
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502

WSSN: 2310

Dear Mr. Kuhlmann:

SUBJECT: Water Main Plan Review Procedure

We have reviewed the draft of this procedure that you submitted and have some comments, suggestions, or questions.

Overall the procedure appears logical and straightforward. It might be helpful to include some contact names, phone numbers and possibly some addresses. The number of sets of plans to be submitted to us (Part 1G and Part 2K) should be specified. In general, at least two sets of plans are needed for our review. We retain one approved set for our files and generally send the community an approved set for their files. If the Water Service Center or another party wants an approved set we can easily accommodate that need.

Similarly, in Part 2A, how many sets of plans does the city require to be submitted to BSI? In addition, does BSI want us to send them a copy of the DEQ construction permit for Part 2 and/or Part 1 projects?

It might be helpful to include a Part 3 for city approval of Genesee county projects. At present, we receive the plans directly from the county and generally wait to receive an approval letter from the water plant supervisor prior to issuing a construction permit. We assume that one set of plans has been submitted by Genesee County directly to the water plant supervisor at the Dort Highway location. We do not copy the city with our permits. This procedure seems to working satisfactorily.

After this procedure is finalized it might be useful to put it on city letterhead and distribute it to the different departments charged with project initiation, design, or review and approval.

It should also be noted that the permitting process should be completed before projects go out for bid. This most important for any project that will be installed by private contractors.

In a related issue, we have a number of questions concerning the actual design of water main projects.

1. Does the city have current water main specifications? We do not have a set on file here and would appreciate a copy for our use.
2. Does the city have current design standards for minimum main size, fire flow requirements, ownership, etc.? Is the city's hydraulic network model able to be used to design new water mains?
3. When replacing water mains, what is the city's policy on lead service line replacement?
4. How many city departments actually initiate or design projects(Part 1A)?
5. Is there a plan or process for determining which water mains are in need of replacement? We realize that critical road projects, CSO problems, re-development projects, etc., often dictate water main replacement. Nevertheless, existing water mains need to be evaluated based on break history, available flows and pressure; water quality, and reliability of service. There is undoubtedly a backlog of projects that need to be addressed.

Regarding future distribution system projects and according to your draft procedure, we will be receiving plans from your office with a cover letter requesting that a permit be issued. The cover letter will verify that the plans are also acceptable to the Water Distribution Division and meet all applicable city standards and specifications. Our typical review time is less than 10 days for most standard water main projects assuming that the applicable design standards are met.

As we discussed at our meeting on February 20, 2001, it would be most helpful for us to meet more frequently to improve communication. I would like to meet with you the last week in April or the first week in May to discuss the items in this letter as well as the reponses we received from you concerning the sanitary survey.

If you have any questions or concerns, please contact me.

Sincerely,

Timothy A. Benton, P.E.
Supervising District Engineer
Field Operations Section
Drinking Water and Radiological
Protection Division
517-625-4682

TAB:lw

cc: Mr. Roger Clapp, City of Flint Water Service Center
Mr. H. Jack Sargent, P.E., City of Flint Director of Public Works & Utilities
Mr. G. Robert Carlyon, City of Flint Water Treatment Plant
Mr. Brian McKenzie, Genesee County Health Department

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RUSSELL J. HARDING, Director

February 23, 2001

Mr. Hans Kuhlmann, P.E., Acting Director
Department of Public Works
City of Flint
1101 S. Saginaw Street
Flint, Michigan 48502

WSSN: 2310

Dear Mr. Kuhlmann:

Subject: Water System Construction Permits

Please find two enclosed Water System Construction Permits for the water main replacement in Martin Luther King Boulevard and water main relocation in main in Leith Street and St. John Boulevard ("UPF" project). Both of these projects were recently brought to our attention after construction had commenced. Please note that Water System Construction Permits are required prior to water main installations. Part 13 of Michigan's Safe Drinking Water Act, 1976 PA, Act 399, as amended, addresses the requirement for permits.

> R 325.1004 - Sec.4 (3) states in part - Before commencing the construction of a waterworks system or an alteration, addition, or improvement to a system, a supplier of water shall submit the plans and specifications for the improvements to the department and secure from the department a permit for construction of the same...

In addition, a third water main project, the U of M-Flint Professional Studies Classroom Building, was completed without a Water System Construction Permit. Upon review of this project, it was determined that the water main as shown is "customer site piping" as defined by the safe drinking water act. Furthermore, the plans depict two connections to the Flint system and a private 8-inch main owned by U of M-Flint. This design creates a "flow through" situation which is expressly prohibited by the safe drinking water act. In general, private ownership of water mains is strongly discouraged by the department. The plans for the U of M-Flint project have been stamped "Accepted for Record" and will be retained for our files. A construction permit will not be issued for this project.

Based on our meeting on February 20, 2001, it is clear that there are several customer site piping situations within the City of Flint's distribution system. It is also apparent that, although the City of Flint does not "own" this piping, it still maintains some degree of control, and may perform or monitor the repairs of privately owned mains. As we

discussed during our meeting, if the full extent of the city's requirements

for privately owned mains can be ascertained, and the degree of city control is judged to be satisfactory, a flow through design may be allowable.

Regarding future distribution system projects, plans should be submitted to this office with a cover letter from the Director of Public Works requesting that a permit be issued. The cover letter should verify that the plans are also acceptable to the Water Distribution Division and meet all applicable city standards and specifications. The typical review time for our department is less than 10 days assuming that the applicable design standards are met.

We would also appreciate receiving a description or protocol from you that outlines the process whereby a proposed project moves through city government. It would be helpful for us to know where in this process the DEQ permit requirements are addressed. Also, I have included a copy of our division policy regarding construction permits and customer site piping for your use.

Another major issue discussed at our meeting was the city's lack of response to our Sanitary Survey of the Flint distribution system. We understand that our evaluation of the system is a topic new to you and that it will take some time for you to review the document and prepare a response. We look forward to hearing from you.

Should you have any questions or concerns, please contact me.

Sincerely,

Timothy A. Benton, P.E., Supervising
District Engineer
Field Operations Section
Shiawassee District Office
Drinking Water and Radiological Protection
Division
(517) 625-4682

cc: Mr. Roger Clapp, City of Flint Water Service Center
Mr. H. Jack Sargent, P.E., City of Flint Director of Public Works & Utilities
Mr. G. Robert Carlyon, City of Flint Water Treatment Plant
Mr. Brian McKenzie, Genesee County Health Department

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RUSSELL J. HARDING, Director

REPLY TO:

SHIAWASSEE DISTRICT OFFICE
10650 BENNETT DR
MORRICE MI 48857-9792

August 29, 2000

Mr. H. Jack Sargent, Jr., Director
Department of Public Works
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502

WSSN: 2310

Dear Mr. Sargent:

SUBJECT: Flint Sanitary Survey Items

In a June 2, 2000 letter, we requested comments from you addressing the items discussed in the Water Distribution System Sanitary Survey. It is our understanding that Robert Carlyon and Roger Clapp would prepare comments on their specific items and forward them to us through you. Since that time, we have not heard from you.

This letter also confirms our meeting with Jacob Hawkins from BSI on June 16, 2000, to discuss Flint's Cross Connection Control Program (CCCP). Our June 22, 2000, letter (copy enclosed) confirmed this meeting. Improvements that are needed with the CCCP were noted and a summary detailing (proposing) what will be accomplished over the next two years was requested.

Please provide us, at your earliest convenience, your response to the Sanitary Survey items that were discussed in our June 1, 2000, meeting. As we discussed, utility operation needs improvement in several areas. The amount of progress made will play a key role in determining whether Flint's overall water system rating improves or declines.

Please call me if you have any questions regarding this or any other water related matter.

Sincerely,

Michael Prysby

Michael F. Prysby, District Engineer
Field Operations Section
Drinking Water and Radiological
Protection Division
517-625-4670

MFP:lw
cc: Mr. Brian McKenzie, Genesee County Health Department

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RUSSELL J. HARDING, Director

REPLY TO:

SHIAWASSEE DISTRICT OFFICE
10650 BENNETT DR
MORRICE MI 48857-9792

June 22, 2000

Mr. Jacob Hawkins, Jr., Senior Code Enf. Officer
City of Flint
Building & Safety Inspections Division, City Hall
1101 South Saginaw Street
Flint, Michigan 48502

WSSN: 2310

Dear Mr. Hawkins:

SUBJECT: Flint Cross Connection Control Program

This letter confirms our meeting on June 16, 2000, with you and Glenn Thomas. The purpose of the meeting was to discuss improvements that are needed with the city's cross connection control program (CCCP). The majority of program improvements that are needed focus on inspection schedules, record keeping, and overall program tracking. An outline of suggested CCCP content was left with you. This outline is again summarized below in the same order.

1. A Cross Connection Control Program needs to be prepared and submitted to our office for review and approval. The program can basically follow the model program outlined in Appendix C of our rules manual. The program should also specify the breakdown of high, moderate, and low priority accounts, and an annual inspection schedule based on designated priorities.

2. Prepare or reconcile your list of accounts that are eligible for routine inspections. This list must include all industrial, commercial, governmental, institutional, and "other" types of non residential accounts. This list should be prioritized according to the degree of risk (high, moderate, low) that each establishment poses. Risk level should be based on both the **potential** for backflow and the degree of **threat or danger** that the backflow poses. This may need to be adjusted after completing inspections at the various locations.

3. A routine inspection schedule needs to be prepared and the frequency would be based on the prioritized list of accounts. As we discussed, high, moderate, and low priority accounts should be inspected at least 1/year, once every 2-3 years, and once every 3-5 years respectively.

4. Inspection records need to be maintained for each account as was noted during our visit. Records may need to be established for some of the establishments. It may be worthwhile to utilize our reporting forms (Appendix D) when updating or adding to your inspection records.

5. Records of corrective action should also be maintained. It was noted that the fines for failure to address cited violations needs to be adjusted. We would agree that the fines need to be increased and would call for a revision of the Cross Connection Control Ordinance (Ordinance No. 3267). Please send us a copy of your draft ordinance for our review prior to being adopted.

6. Maintain an active on-going RPZ device testing program each year. The total number of RPZs tested each year needs to be noted on the annual report. Testing of other types of backflow preventers will eventually be required. We will keep you informed as to the status of this new requirement.

7. Provide continued training in cross connection control in order to conduct the vital program elements effectively. We would suggest sending your operators to our Cross Connection Control Seminar in Lansing. Also, there are other organizations including AWWA, Rural Water, and Midwest Backflow Prevention that offer further cross connection control training. Finally, it may also be worthwhile to retain a consultant who can also offer program training assistance. Additional information listing various training courses in cross connection is enclosed with this letter.

Finally, it appears, based on our discussion, that BSI intends to update the cross connection control program. We realize that a program of this magnitude will take a lot of time, effort, and personnel towards improving the CCCP. It was noted that an additional one or two operators may be needed in order to adequately implement this program. We would encourage the city to review staffing needs with BSI and authorize the additional workforce needed. Finally, we would like to receive a summary detailing (proposing) what will be done in 2000 and 2001 towards improving this program. We will review this and discuss some of the various aspects, as needed, in more detail.

We appreciate your time and assistance during the visit. Please don't hesitate to call me if you have any questions regarding this or any other water related matter.

Sincerely,

Michael Prysby

Michael F. Prysby, District Engineer
Field Operations Section
Drinking Water and Radiological
Protection Division
517-625-4670

MFP:lw
cc: Mr. Jack Sargant, Utilities Director, City of Flint
Mr. Glenn Thomas, BSI, City of Flint
Mr. Brian McKenzie, Genesee County Health Department

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RUSSELL J. HARDING, Director

REPLY TO:

SHIAWASSEE DISTRICT OFFICE
10650 BENNETT DR
MORRICE MI 48857-9792

June 2, 2000

Mr. H. Jack Sargent, Director
Department of Public Works
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502

WSSN: 2310

Dear Mr. Sargent:

SUBJECT: Sanitary Survey Review

Thank you for the opportunity to discuss the issues raised as part of our Sanitary Survey of the Flint water distribution system. Although we did not have as much time as we would have liked to thoroughly review all the items, it was agreed that Bob Carlyon and Roger Clapp would prepare comments on their specific items and forward them to us through you. In addition, we will contact Jacob Hawkins to set up a meeting to discuss the cross connection program in more detail.

As we noted, the city distribution system has been given an overall "Marginal" rating. However, there are a couple areas of utility operation that are clearly deficient and that need significant attention. Many of the items will take time to correct but a commitment must be made and progress must be forthcoming. The city's efforts over the next 12 to 24 months will determine if the overall system rating improves or declines.

If at any time questions arise concerning the survey or any water system issue, please call me at the number below or Mike Prysby at 517-625-4670.

Sincerely,

Timothy A. Benton, P.E.
Supervising District Engineer
Field Operations Section
Drinking Water and Radiological
Protection Division
517-625-4682

TAB:lw

cc: Mr. G. Robert Carlyon, Water Plant Supervisor
Mr. Roger Clapp, Water Distribution Supervisor
Mr. Jacob Hawkins, Building & Safety Inspections

MFP

STATE OF MICHIGAN

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RUSSELL J. HARDING, Director

REPLY TO:
SHIAWASSEE DISTRICT OFFICE
10650 BENNETT DR
MORRICE MI 48857-9792

March 20, 2000

Mr. H. Jack Sargent, P.E., Director of Public Works
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502

WSSN: 2745

Dear Mr. Sargent:

SUBJECT: Sanitary Survey
City of Flint Water Distribution System

Enclosed is a copy of the city of Flint's Water Distribution System Sanitary Survey completed by this department. This report is being submitted for your review and comment.

Your attention should be directed to pages 23 through 33 which details our observations, conclusions, and recommendations. Also, page 34 provides a brief summary of the individual items that need to be addressed and references the pages in the report where those items are discussed.

Items # 1 and 2 pertain to Flint's storage and booster pumping stations. This discusses the need to develop and follow through on a proposed pumping station Master Plan.

Item #3 discusses the need to develop a Capital Improvements Program that addresses both transmission and distribution system needs.

Item #4 discusses the need to establish an adequate operation and maintenance program for hydrants and valves.

Item #5 discusses additional operational details that need to be included as part of Flint's monthly operation reporting.

Items #6, 8, 9, and 10 discuss the various water system programs and plans. This includes improvements needed with the Cross Connection Control Program and preparation of an adequate Contingency Plan. Updating the water system General Plan and a continuation of the Lead and Copper Program are also discussed.

Item #7 discusses the need to formalize the city's water main extension approval process.

Item #11 discusses the need and benefits of promoting operator certification and training.

The items vary in priority and are listed without ranking.

We wish to thank your staff for their time and assistance given during the survey and preparation of the report. We will be contacting you to arrange a time to meet and discuss the contents of this report.

Sincerely,

Michael F. Prysby, P.E., District Engineer
Field Operations Section
Drinking Water and Radiological
Protection Division
517-265-4670

MFP:lw
Enclosure
cc: Mr. David Ready, City Administrator
Mr. G. Robert Carlyon, Water Treatment Plant Supervisor
Mr. Roger Clapp, Water Distribution Supervisor
Mr. Kenneth LaBelle, BSI Administrator
Mr. Brain McKenzie, Genesee County Health Department

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RUSSELL J. HARDING, Director

February 14, 2000

Mr. G. Robert Carlyon
City of Flint Water Plant
4500 North Dort Highway
Flint, Michigan 48505

Dear Mr. Carlyon:

SUBJECT: Bacteriological Monitoring and Reporting

This letter confirms my visit on January 20, 2000 with you, David Jansen, and Cindy Butcher. The purpose of the visit was to discuss sample results obtained from the city distribution system in December that were positive for total coliform bacteria. Tim Benton from our office also participated in the discussion.

Routine and repeat distribution system bacteriological monitoring during the month of December produced a total of eight results that were positive for total coliform. Since a total of 155 distribution system samples were noted on the Monthly Operation Report (MOR), the number of total coliform positive results exceeds five percent of the total number of samples collected and would constitute a total coliform Maximum Contaminant Level (MCL) violation. A closer review of Flint's bacteriological monitoring program revealed that distribution system monitoring is routinely conducted at Control Station #2, however, they are not reported as distribution samples. Although monitoring at Control Station #2 was never reported on the MOR as distribution system samples, we agree with the concept of adding Control Station #2 samples to the total number of distribution samples that are collected. This will result in a total of 279 distribution system samples for the month of December with nine being positive for total coliform. Since this is less than five percent of the total, an MCL violation did not occur. As we discussed, the monitoring results from the Control Station need to be reported on the distribution system page of the Monthly Operation Report (MOR). Finally, we will update our data tracking system to include Control Station #2 sampling as distribution system samples for the entire 1999 calendar year.

Next, revisions with the city's bacteriological Sampling Site Plan are underway. Specifically, there remains the difficulty of maintaining consistency with some of the repeat sampling locations on the city's north side. Plans are underway to install Eclipse monitoring stations at some of these locations. These changes will be noted on the updated Sampling Site Plan.

Finally, samples are collected from 14 locations out of which three are from city owned facilities. The concentration of sampling locations, however, may be slightly overdone on the city's west side. Although there is no requirement within the Michigan Safe Drinking Water Act that establishes a minimum number of sampling locations, we would suggest that a minimum of ten routine distribution system sampling locations be utilized.

Please send us a copy of your revised Sampling Site plan after the revisions are completed.

If you have any questions regarding this or any other water related matter, feel free to call me.

Sincerely,

Michael Prysby

Michael F. Prysby, P.E., District Engineer
Field Operations Section
Drinking Water and Radiological
Protection Division
517-625-4670

MFP:lw
cc: Mr. Dave Jansen, City of Flint Water Plant
Ms. Cindy Butcher, City of Flint Water Plant
Mr. Brian McKenzie, Genesee County Health Department

127 FP

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RUSSELL J. HARDING, Director

REPLY TO:
SHIAWASSEE DISTRICT OFFICE
10650 BENNETT DR
MORRICE MI 48857-9792

January 18, 2000

Mr. Jack H. Sargant, Director of Public Works
City of Flint
1101 South Saginaw Street
Flint, Michigan 48502-1416

Dear Mr. Sargent:

SUBJECT: City of Flint Water System Sanitary Survey
Draft Report

Enclosed is a draft report of our 1999 Flint Water System Sanitary Survey. Two copies of the draft report were left at the Flint Water Treatment Plant for Robert Carlyon and Roger Clapp. Please review the draft report at your earliest convenience and provide us with any comments as needed.

We anticipate having a final report completed by March 1, 2000.

If you have any questions regarding this or any other water related matter, feel free to call me at the number listed below.

Sincerely,

Michael F. Prysby, P.E., District Engineer
Field Operations Section
Drinking Water and Radiological
Protection Division
517-625-4670

MFP:lw
Enclosures
cc: Mr. G. Robert Carlyon, Water Treatment Plant Supervisor
Mr. Roger Clapp, Water Distribution Maintenance Supervisor, Water Service Center
Mr. Kenneth Labelle, Administrator, Building and Safety Inspections
Mr. Brian McKenzie, Genesee County Health Department

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RUSSELL J. HARDING, Director

REPLY TO:
SHIAWASSEE DISTRICT OFFICE
10650 BENNETT DR
MORRICE MI 48857-9792

July 29, 1999

Mr. H. Jack Sargent, P.E., Director
City of Flint - Public Works and Utilities
1101 South Saginaw Street
Flint, Michigan 48502

WSSN 2310

Dear Mr. Sargent:

SUBJECT: Shiloh Commons Water Main Installation

This letter is to acknowledge receipt of the revised set of plans for the Shiloh Commons water main installation that was prepared by GM Engineer and Associates and submitted to this office by you. It is our understanding that the water main for this project is already installed.

As a reminder, Section 4 of Public Act 399, 1976, requires that the water supplier obtain a permit prior to the installation or construction of any water system improvement. In addition, plans submitted for our review need to be signed and sealed by a Licensed Professional Engineer.

As such, the plans have been stamped "Accepted for Record" and will be kept for our files. A water system construction permit will not be issued for this project.

Should you have any concerns or questions, please contact me at the number below.

Sincerely,

Michael Prysby

Michael F. Prysby, P.E., District Engineer
Field Operations Section
Drinking Water and Radiological
Protection Division
517-625-4670

MFP:JAW:lw
cc: GM Engineer and Associates
Mr. G. Robert Carlyon – Water Treatment Plant
Genesee County Health Department

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RUSSELL J. HARDING, Director

REPLY TO:
SHIAWASSEE DISTRICT OFFICE
10650 BENNETT DR
MORRICE MI 48857-9792

June 29, 1999

Mr. H. Jack Sargent, P.E., Director
Department of Public Works and Utilities
City Hall
1101 South Saginaw Street
Flint, Michigan 48502

SUBJECT: Water System Construction Permit Application
General Motors Infrastructure Improvements - Phase 2

Dear Mr. Sargent:

As discussed this morning during a telephone conversation with Mr. Jim Watling, of this office, a Water System Construction Permit cannot be issued for the above project until we receive written correspondence from the city of Flint that the project plans and specifications have been reviewed and approved. Part 13 of Michigan's Safe Drinking Water Act, 1976 PA 399, states the following:

> R 325.11302 – Rule 1302 (1). For Type I water supplies, before the construction or alteration of any waterworks system, or a portion thereof, plans and specifications shall be submitted to the department by the supplier of water or designated agent for review, approval, and issuance of a permit.

It is our intent to expeditiously issue permits for water main construction. However, we need to be sure the appropriate city official(s) have reviewed and approved the final proposed plans prior to issuance of a permit. If someone other than you will be issuing approval on the city's behalf, we should be notified accordingly.

Should you have any questions or concerns, please don't hesitate to contact me.

Sincerely,

Timothy A. Benton, P.E.
Supervising District Engineer
Field Operations Section
Drinking Water and Radiological
Protection Division
517-625-4682

EQP 0100e
(Rev. 1/98)

TAB:lw

cc: Mr. David DiPietro, P.E., Project Manager - Wade-Trim, Inc.

STATE OF MICHIGAN

JOHN ENGLER, Governor

DEPARTMENT OF ENVIRONMENTAL QUALITY

"Better Service for a Better Environment"

HOLLISTER BUILDING, PO BOX 30473, LANSING MI 48909-7973

INTERNET: www.deq.state.mi.us

RUSSELL J. HARDING, Director

REPLY TO:

SHIAWASSEE DISTRICT OFFICE
10650 BENNETT DR
MORRICE MI 48857-9792

June 29, 1999

Mr. H. Jack Sargent, P.E., Director
Department of Public Works and Utilities
City Hall
1101 South Saginaw Street
Flint, Michigan 48502

SUBJECT: Water System Construction Permit Application
University Park Estates

Dear Mr. Sargent:

As discussed this morning during a telephone conversation with Mr. Jim Watling, of this office, a Water System Construction Permit cannot be issued for the above project until we receive written correspondence from the city of Flint that the project plans and specifications have been reviewed and approved. Part 13 of Michigan's Safe Drinking Water Act, 1976 PA 399, states the following:

> R 325.11302 – Rule 1302 (1). For Type I water supplies, before the construction or alteration of any waterworks system, or a portion thereof, plans and specifications shall be submitted to the department by the supplier of water or designated agent for review, approval, and issuance of a permit.

It is our intent to expeditiously issue permits for water main construction. However, we need to be sure the appropriate city official(s) have reviewed and approved the final proposed plans prior to issuance of a permit. If someone other than you will be issuing approval on the city's behalf, we should be notified accordingly.

Should you have any questions or concerns, please don't hesitate to contact me.

Sincerely,

Timothy A. Benton, P.E.
Supervising District Engineer
Field Operations Section
Drinking Water and Radiological
Protection Division
517-625-4682

EQP 0100e
(Rev. 1/98)

TAB:lw

cc: Mr. Bob Reh, P.E., Project Manager - Rowe, Inc.

STATE OF MICHIGAN

JOHN ENGLER, Governor
DEPARTMENT OF ENVIRONMENTAL QUALITY
"Better Service for a Better Environment"
HOLLISTER BUILDING, PO BOX 30473, LANSING MI 48909-7973
INTERNET: www.deq.state.mi.us
RUSSELL J. HARDING, Director

REPLY TO:
SHIAWASSEE DISTRICT OFFICE
10650 BENNETT DR
MORRICE MI 48857-9792

February 2, 1999

Mr. Roger Clapp, Supervisor
Flint Water Service Center
3310 East Court Street
Flint, Michigan 48506

Dear Mr. Clapp:

SUBJECT: Flint Water System

This letter confirms our meeting at the Flint Water Treatment Plant on January 27, 1999. The purpose of the meeting was to discuss the completion of the 1999 Infrastructure Needs Survey. Some time was also spent discussing submittal and review of construction plans for water main extensions. Specific items are discussed below in more detail:

1. Items listed on the Infrastructure Needs Survey were discussed with you and Bob Carylon. Some modifications were made in main sizes and the number of valves. Also, the breakdown of costs for several projects associated with serving Genesee County will need to be clarified. Arrangements will be made to meet with the county and the city to resolve the remaining items.

2. As we discussed, the needs survey is very similar to our Distribution System Sanitary Survey. The survey will cover the major aspects of Flint's distribution system including the condition of the distribution and transmission piping, pumping stations, and storage facilities. The survey also includes a check on the status of the operator certification program, water quality, and the utility's record keeping and monitoring programs. Finally, the Cross Connection Control Program (handled by another city department) will also be evaluated. The findings of the survey and recommendations that follow will help provide additional basis to support Drinking Water Revolving Loan (DWRF) projects and the Infrastructure Needs Survey.

3. Our department has recently received requests for permits for water main extensions. However, there was no indication that the city has reviewed and approved these plans. A plan review protocol needs to be developed. The typical procedure would require consultants to submit plans to the city for review and approval. Plans approved by the city would then be sent to our office for our review and issuance of a state construction permit. Also, we should have a copy of the city's current standard specifications. Finally, it appears that a water main project has commenced without the issuance of a construction permit as required by the Michigan Safe Drinking Water Act. Arrangements will be made to meet with you to discuss this project and the entire permitting process in more detail.

A water system survey form was left with you during our meeting. Arrangements will be made to work with you over the next several months to complete this document. I am looking forward to working with you and other staff from the Water Service Center towards completing the survey.

If you have any questions, please do not hesitate to call me.

Sincerely,

Michael F. Prysby, P.E., District Engineer
Field Operations Section
Drinking Water and Radiological
Protection Division
517-625-4670

MFP:lw
Enclosure
cc: Mr. Jack H. Sargent, P.E., Director, Water Service Center, City of Flint
Mr. Robert Carylon, Water Treatment Plant
Mr. Brian McKenzie, Genesee County Health Department

STATE OF MICHIGAN CONTRACT NO. 271N3200089

CITY OF FLINT WATER SUPPLY ASSESSMENT

At the request of the Treasurer, Tucker, Young, Jackson, Tull, Inc. (TYJT) makes the following recommendation to the Department of Treasury concerning Flint's water supply alternatives. Based on the financial analysis performed of the various options presented by DWSD to continue treated water service to Flint compared to Flint being supplied by the new KWA untreated water system, TYJT believes that several of the options presented by DWSD are lower in cost currently and over the long run than the one offered by KWA. TYJT also believes that DWSD's most recent offer (subsequent to the submittal of our report) to build a smaller parallel water main from Imlay to Flint, funded by the entire DWSD base of customers, is the best solution offering the least cost alternative and the required redundancy by MDEQ.

Furthermore, since a majority of the KWA system has not been designed and none of the system has been constructed, there is an additional risk that the cost of the KWA system may actually be higher than estimated due to potential construction delays and unforeseen conditions. This risk to Flint could be substantial since the city is responsible for 30 percent of the KWA design and construction costs while still having to purchase water from DWSD during the construction period.

Finally, there are other issues that were identified in our report that may result in risks to Flint if it were to join KWA that should be considered by the Treasury in determining how Flint's potable water should be supplied. These issues are related to redundancy and reliability, other items affecting cost, and Flint's desire to control its own destiny related to its water supply. These are described further below.

- DWSD's supply to Flint is via a 72-inch water main from Imlay City. This main also supplies Imlay City, Mayfield and the Greater Lapeer County Utilities Authority (GLCUA). The volume of water contained within the 72-inch main is approximately 30 million gallons. If Genesee and Flint move to KWA then the three remaining communities' consumption would most likely not be large enough to maintain fresh water in DWSD's pipeline (due to loss of chlorine residual). DWSD may consider shutting down the 72-inch line completely due to the water quality concerns, which would then create an additional burden for Imlay, Mayfield and GLCUA to finance treated water supplies.
- The KWA supply option is counter to the Treasury's Competitive Grant Assistance Program (Formerly EVIP Grant). This program has been put in place to allow for communities to consolidate their services and save money. Two existing customers of DWSD (Flint and Genesee County) along with the potential of others customers (GLCUA, Mayfield, Imlay City) separating from another water system is in contradiction to the program.
- There is a concern over the ability of smaller systems (KWA) over larger systems (DWSD) to pay for future unfunded mandates and regulations. Obviously, identifying regulation requirements over 30 years is hard to determine. However, it is widely accepted that a large system has greater ability to respond to unfunded mandates because the cost can be distributed over a large customer base.
- Although Flint will be responsible for 30 percent of the construction cost, they will only have a minority vote on the KWA board. Furthermore, there are other communities (Lapeer County, the City of Lapeer, and Sanilac County) that sit on the board and vote. However, they are not purchasing water nor contributing to the construction costs. Their position on the KWA Board will not provide them an ability to "control their own destiny," as they have stated to the Treasury.

Summary of FY 2013-14 DWSD Cost Allocations to Flint Under Various Scenarios

Flint Only

		Revenue Requirement	Rates and Charges: Fixed	Rates and Charges: Commodity	Rates and Charges: *Avg Unit Cost*
1	**Status Quo *(Flint Portion)***	12,574,900	379,304	13.01	*20.39*
2	**Suggested Cct *(Flint Portion)***	11,281,100	351,661	12.06	*19.27*
3	Change	(1,293,800)	(27,643)	(0.95)	*(1.12)*
4	% Change	-10.3%	-7.3%	-7.3%	*-5.5%*
5	**Max Day Only**	9,904,300	294,542	10.87	*16.91*
6	Change	(1,376,800)	(57,119)	(1.19)	*(2.36)*
7	% Change	-13.9%	-19.4%	-10.9%	*-14.0%*
8	**Add CTA Line to BP**	10,093,100	310,271	10.87	*17.23*
9	Change	188,800	15,729	0.00	*0.32*
10	% Change	1.9%	5.1%	0.0%	*1.9%*
11	**CTA to BP / Flint only to FWTP**	12,446,300	506,371	10.87	*21.25*
12	Change	2,353,200	196,100	0.00	*4.02*
13	% Change	18.9%	38.7%	0.0%	*18.9%*
14	**Add CTA Line to FWTP**	10,191,200	318,450	10.87	*17.40*
15	Change	(2,255,100)	(187,921)	0.00	*(3.85)*
16	% Change	-22.1%	-59.0%	0.0%	*-22.1%*
17	**CTA to FWTP / Buy existing 72**	10,009,600	303,315	10.87	*17.08*
18	Change	(181,600)	(15,135)	0.00	*(0.32)*
19	% Change	-1.8%	-5.0%	0.0%	*-1.9%*
20	Cumulative Change	(2,565,300)	(75,989)	(2.14)	*(3.31)*
21	Cumulative % Change	-20.4%	-20.0%	-16.4%	-16.2%

		Assumptions: Avg Day *mgd*	Assumptions: Max Day *mgd*	Assumptions: Peak Hour *mgd*	DWSD Investment: CTA *$*	DWSD Investment: Flint Only *$*
1	**Status Quo**	24.6	45.6	47.7	0	0
2	**Suggested Contract**	23.4	**40.6**	**42.4**	0	0
3	**Max Day Only**	**12.0**	**18.0**	**18.0**	0	0
4	**Add CTA Line to BP**	12.0	18.0	18.0	62,290,800	0
5	**CTA to BP / Flint only to FWTP**	12.0	18.0	18.0	62,290,800	32,391,300
6	**Add CTA Line to FWTP**	12.0	18.0	18.0	94,682,100	0
7	**CTA to FWTP / Buy existing 72**	12.0	18.0	18.0	94,682,100	(2,500,000)

DWSD Worksheet : 18 MGD Maximum Day Customer with Model Contract Twinning Line and Owning both to the Flint WTP

18 MGD ?

Capacity

Flint ADD:	0.00 MGD	- MCF/Day
DWSD ADD:	12 MGD	3,504 MCF/Day

Annual Volume

Flint:	- MCF
DWSD:	585,561 MCF

2013 Cost of Supply

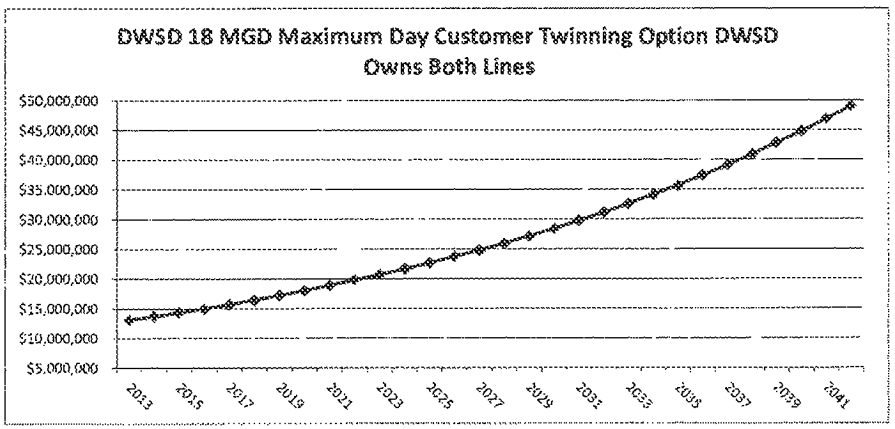
Flint WTP O&M:	-	/MCF	$ -	/Yr
DWSD:	$ 17.08	/MCF	$ 10,001,390	/Yr

Escalation/Inflation Rate

Flint:	4.51% /Yr
DWSD:	4.7% /Yr

Capital Expenditure

Amount:	$ -		
Reserve:	$ -	0%	Reserve Rate: 0.00%
Amount plus Reserve:	$ -		
Revenue Bond Rate:	5%		
Number of Years:	25		
Annual Cost:	$0		



	Year	Flint WTP O&M	Water Purchase	Revenue Bond Payment	Interest on Reserve	TOTAL
1	2013	$ -	10,001,390		-	$ 10,001,390
2	2014	$ -	10,471,456		-	$ 10,471,456
3	2015	$ -	10,963,614		-	$ 10,963,614
4	2016	$ -	11,478,904	-	-	$ 11,478,904
5	2017	$ -	12,018,412	-	-	$ 12,018,412
6	2018	$ -	12,583,278	-	-	$ 12,583,278
7	2019	$ -	13,174,692	-	-	$ 13,174,692
8	2020	$ -	13,793,902	-	-	$ 13,793,902
9	2021	$ -	14,442,216	-	-	$ 14,442,216
10	2022	$ -	15,121,000	-	-	$ 15,121,000
11	2023	$ -	15,831,687	-	-	$ 15,831,687
12	2024	$ -	16,575,776	-	-	$ 16,575,776
13	2025	$ -	17,354,838	-	-	$ 17,354,838
14	2026	$ -	18,170,515	-	-	$ 18,170,515
15	2027	$ -	19,024,529	-	-	$ 19,024,529
16	2028	$ -	19,918,682	-	-	$ 19,918,682
17	2029	$ -	20,854,860	-	-	$ 20,854,860
18	2030	$ -	21,835,039	-	-	$ 21,835,039
19	2031	$ -	22,861,286	-	-	$ 22,861,286
20	2032	$ -	23,935,766	-	-	$ 23,935,766
21	2033	$ -	25,060,747	-	-	$ 25,060,747
22	2034	$ -	26,238,602	-	-	$ 26,238,602
23	2035	$ -	27,471,816	-	-	$ 27,471,816
24	2036	$ -	28,762,992	-	-	$ 28,762,992
25	2037	$ -	30,114,852	-	-	$ 30,114,852
	2038	$ -	31,530,250	-	-	$ 31,530,250
	2039	$ -	33,012,172	-	-	$ 33,012,172
	2040	$ -	34,563,744	-	-	$ 34,563,744
	2041	$ -	36,188,240	-	-	$ 36,188,240
	2042	$ -	37,889,088	-	-	$ 37,889,088
		$ -				

25 Yrs Cummulative
$ 458,060,853

30 Yrs Cummulative
$ 631,244,349

DWSD Worksheet : 18 MGD Maximum Day Customer with Model Contract Twinning Line and Owning Only New Line to the Flint WTP

Capacity

Flint ADD:	0.00	MGD	- MCF/Day
DWSD ADD:	12	MGD	1,604 MCF/Day

Annual Volume

Flint:	-	MCF
DWSD:	585,561	MCF

2013 Cost of Supply

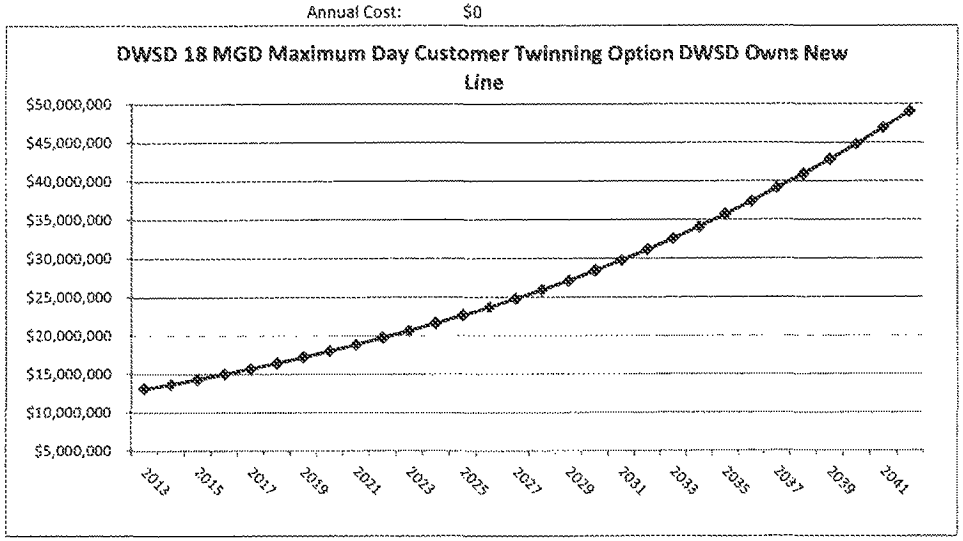
Flint WTP O&M:	-	/MCF	$ -	/Yr
DWSD:	$ 17.40	/MCF	$ 10,188,770	/Yr

Escalation/Inflation Rate

Flint:	4.51% /Yr
DWSD:	4.7% /Yr

Capital Expenditure

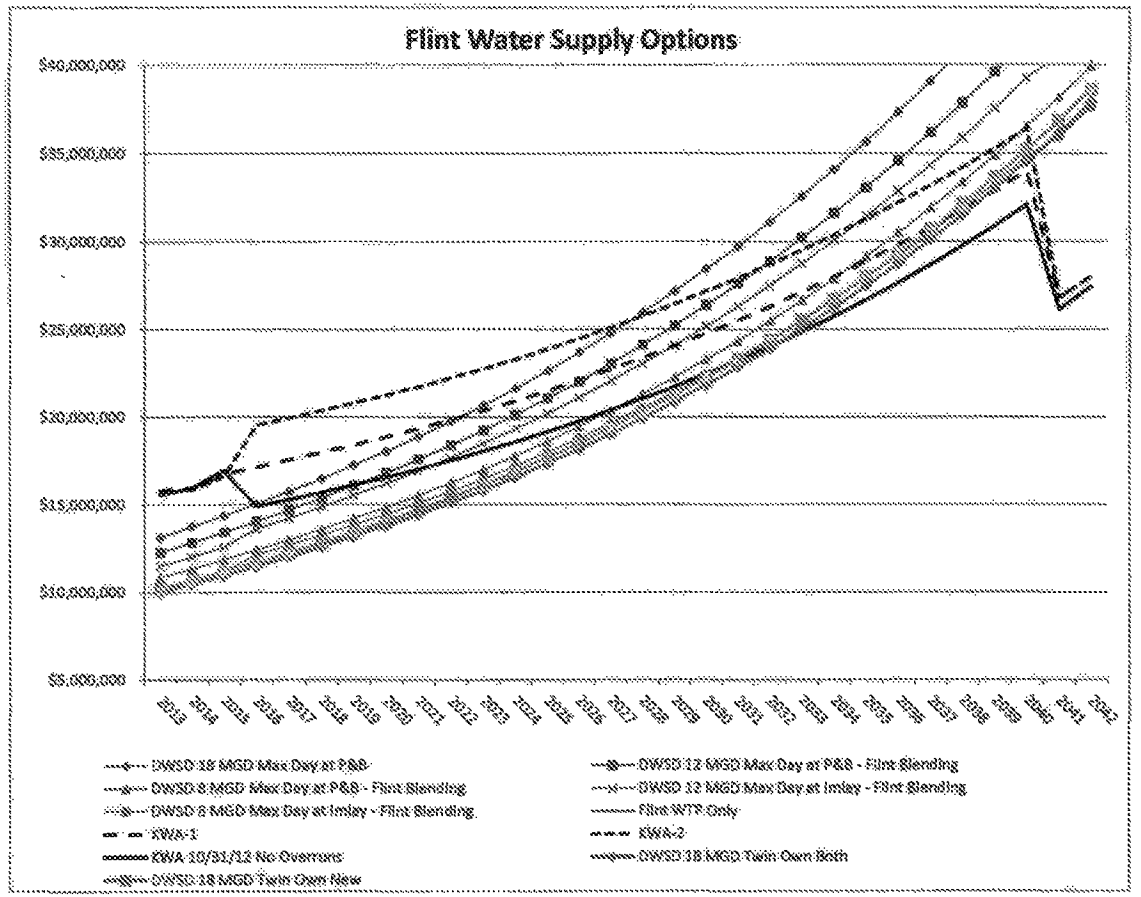
Amount:	$ -		
Reserve:	$ -	0%	Reserve Rate: 0.00%
Amount plus Reserve:	$ -		
Revenue Bond Rate:	5%		
Number of Years:	25		
Annual Cost:	$0		



	Year	Flint WTP O&M	Water Purchase	Revenue Bond Payment	Interest on Reserve	TOTAL
1	2013	$ -	10,188,770		-	$ 10,188,770
2	2014	$ -	10,667,642		-	$ 10,667,642
3	2015	$ -	11,169,021		-	$ 11,169,021
4	2016	$ -	11,693,965	-	-	$ 11,693,965
5	2017	$ -	12,243,582	-	-	$ 12,243,582
6	2018	$ -	12,819,030	-	-	$ 12,819,030
7	2019	$ -	13,421,525	-	-	$ 13,421,525
8	2020	$ -	14,052,336	-	-	$ 14,052,336
9	2021	$ -	14,712,796	-	-	$ 14,712,796
10	2022	$ -	15,404,297	-	-	$ 15,404,297
11	2023	$ -	16,128,299	-	-	$ 16,128,299
12	2024	$ -	16,886,330	-	-	$ 16,886,330
13	2025	$ -	17,679,987	-	-	$ 17,679,987
14	2026	$ -	18,510,946	-	-	$ 18,510,946
15	2027	$ -	19,380,961	-	-	$ 19,380,961
16	2028	$ -	20,291,866	-	-	$ 20,291,866
17	2029	$ -	21,245,584	-	-	$ 21,245,584
18	2030	$ -	22,244,126	-	-	$ 22,244,126
19	2031	$ -	23,289,600	-	-	$ 23,289,600
20	2032	$ -	24,384,211	-	-	$ 24,384,211
21	2033	$ -	25,530,269	-	-	$ 25,530,269
22	2034	$ -	26,730,192	-	-	$ 26,730,192
23	2035	$ -	27,986,511	-	-	$ 27,986,511
24	2036	$ -	29,301,877	-	-	$ 29,301,877
25	2037	$ -	30,679,065	-	-	$ 30,679,065
	2038	$ -	32,120,981	-	-	$ 32,120,981
	2039	$ -	33,630,667	-	-	$ 33,630,667
	2040	$ -	35,211,309	-	-	$ 35,211,309
	2041	$ -	36,866,240	-	-	$ 36,866,240
	2042	$ -	38,598,953	-	-	$ 38,598,953
		$ -				

25 Yrs Cummulative	
$	466,642,790

30 Yrs Cummulative	
$	643,070,941



Option	Costs through 2042	Ranking
Flint WTP Only	$ 590,443,893	1
DWSD 8 MGD Max Day at Imlay	$ 634,795,488	2
KWA 10/31/12 Update	$ 649,775,166	3
DWSD 8 MGD Max Day at P&B	$ 672,671,705	4
KWA-1	$ 707,279,715	5
DWSD 12 MGD Max Day at Imlay	$ 725,576,803	6
DWSD 12 MGD Max Day at P&B	$ 762,130,308	7
KWA -2	$ 786,784,313	8
DWSD 18 MGD Max Day at P&B	$ 821,226,268	9
DWSD 18 MGD Max Twin Own Both	$ 631,244,349	
DWSD 18 MGD Max Own New Line	$ 643,070,981	

Prysby, Mike (DEQ)

From: Benzie, Richard (DEQ)
Sent: Wednesday, April 01, 2015 2:09 PM
To: Busch, Stephen (DEQ)
Cc: Cook, Pat (DEQ); Prysby, Mike (DEQ)
Subject: RE: Schedule 2 plants

4/1/15 Population chg's per census

I think we can safely place them in Schedule 2. If that schedule results in their monitoring not being completed before they connect to the Authority's pipeline, we should ask them to complete the monitoring so both we and they know their LT2 Bin Classification and what level of treatment is appropriate should they ever need to rely upon the river again.

As for the Needs Survey, the 2013 Census Bureau estimate could have justified them being excluded from the category of systems serving greater than 100,000 that all have to submit a survey. However, since we used a population of over 102,000 for their 2015 Annual PWS fee and the city paid it, we can assume the population EPA and Cadmus were given on the date they froze the data for the Needs Survey was over 100,000. Next survey, the city will have to be randomly selected to be included unless they reverse the population decline by 2018-19.

From: Busch, Stephen (DEQ)
Sent: Wednesday, April 01, 2015 1:54 PM
To: Benzie, Richard (DEQ)
Cc: Cook, Pat (DEQ); Prysby, Mike (DEQ)
Subject: RE: Schedule 2 plants

Here is the timeline I have for Flint population info.

3/2013 Sanitary survey completed and mailed based on 2010 Census population of 102,434

7/2013 Census Bureau publishes 2013 census estimate for Flint of 99,763

11/2014 LT2 schedule developed with Flint Schedule 2 based on latest (2013) census estimate.
Estimate validated by City DPW staff based on vacated service accounts.

Based on the Needs Survey emails from EPA it would appear that the Need Survey populations were validated by the states earlier than November 15, 2014, which is prior to this population change.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

From: Cook, Pat (DEQ)
Sent: Monday, March 30, 2015 3:11 PM
To: Prysby, Mike (DEQ)
Cc: Busch, Stephen (DEQ); Rosenthal, Adam (DEQ)
Subject: RE: Schedule 2 plants

Before you change the population in SDWIS, we need to discuss this with Richard. He is concerned about some other ramifications by lowering their population below 100k for some other programs, like the Needs Survey.

pat

From: Prysby, Mike (DEQ)
Sent: Monday, March 30, 2015 7:48 AM
To: Cook, Pat (DEQ)
Cc: Busch, Stephen (DEQ); Rosenthal, Adam (DEQ)
Subject: RE: Schedule 2 plants

Pat,

Your note serves as a reminder for me to confirm Flint's population (<100,000). I requested the city to provide us with the most recent number of residential accounts ...if which they have responded. Flint's most recent estimate of residential accounts shows further loss of customer base...and is below 100K. I will tally up the numbers, compare against their most recent Sanitary Survey and provide an updated population estimate for Adam to enter into SDWIS.

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 290-8817

From: Cook, Pat (DEQ)
Sent: Friday, March 27, 2015 4:02 PM
To: Bolf, Michael (DEQ); Brennan, Patrick (DEQ); Bridges, Jeriesha (DEQ); Brookens, Todd (DEQ); Chooi, Wood (DEQ); Conradson, Scott (DEQ); Dehtiar, Luke (DEQ); Drake, Jerry (DEQ); Esparsa, Brian (DEQ); Gotham, Daryl (DEQ); Islam, Abuzoha (DEQ); Johnson, Stephanie (DEQ); Joseph, Mark (DEQ); London, Bob (DEQ); Lopez, Amber (DEQ); Pascoe, Doug (DEQ); Prysby, Mike (DEQ); Reinke, Joseph (DEQ); Reyes, Katelyn (DEQ); Sarkipato, Ernest (DEQ); Skinker, Bethel (DEQ); Slater, Brad (DEQ); Swendsen, Kurt (DEQ); Swenor, Scott (DEQ); Thurston, Brian (DEQ); Wozniak, Gary (DEQ)
Subject: Schedule 2 plants

Hi All,

According to the population figures in SDWIS, below is a list of Schedule 2 water plants that will have to conduct a second round of Crypto, E. coli and turbidity sampling from their raw water source(s) starting in October, 2015. This monitoring is required by the Long Term 2 Enhanced Surface Water Treatment Rule and Act 399. As a reminder, a Schedule 2 water plant serves 50,000 to 99,999 people OR belongs to a Combined Distribution System in which the largest system serves 50,000 to 99,999.

The plan is to forward to the appropriate district engineers a sample letter and Monitoring Plan template that they in turn will have to mail to the plants. The letter explains the source water sampling requirements while also reminding them that the monitoring plans have to completed/submitted to the district office's by July 1st.

Please look at the below list and let me know if any plants meeting the Schedule 2 definition are missing or need to be added.

Schedule 2 Plants

- All plants receiving raw water from the Saginaw Midland pipeline: Au Gres, Linwood, Omer, Saginaw, Sims-Whitney, Standish, Midland
- Flint
- Wyoming

Patrick Cook, P.E.
Community Drinking Water Unit
Office of Drinking Water & Municipal Assistance
Michigan Department of Environmental Quality
Phone: (517) 284-6514
cookp@michigan.gov

EM Press Briefing For Week of 5/01/2013

KWA vs. DWSD Facts & Figures

- The Karegnondi Water Authority (KWA) is regional water authority that would provide raw water to Flint and Genesee County via a direct pipeline.
- This offer has more risk involved than previous proposals. KWA would be responsible for between 20% and 100% of the repair costs on the pipeline and related assets from Port Huron
- The numbers in the offer do not make sense. DWSD indicates savings of over $900 million while KWA's total cost over 30 years is less than $650 million.
- Offer is based on very little capital improvements, no repairs and a 4.7% annual increase over the life of the contract.
- There are no rate guarantees after the first year for capital, O & M or consumption.
- KWA would be responsible for redundancy at a cost of $94.68 million per DWSD's estimate.
- Does not guarantee a rate structure if system regionalizes or DWSD regionalizes, or Detroit enters bankruptcy.
- Flint and Genesee County could have a connected waste/water system that serves all or part of five counties.
- The potential for further consolidation of services between the city and the county i.e...water, wastewater, 911, etc,
- This partnership will give Flint ownership of the city's own water supply system with real representation on its board of directors, making all treatment and delivery system decisions.
- Flint's participation allows the city to utilize its own water treatment facility that it has invested $50 million into and only currently exercises four weeks per year.
- The investment gives Flint and Genesee County a new pipeline with a life expectancy of 75 years, as well as a 2nd product, untreated water. Under DWSD we would have no ownership after the end of the contract, and a new pipeline would still need to be built.

- A 30 year contract with DWSD keeps Flint and Genesee County on a system that is 48 years old with a design life of 75 years. There will be necessary major investments or replacement costs that are not accounted for in this DWSD proposal.
- KWA guarantees its capitol rate for 25 years. The capitol rate is 90 % of the total costs.
- The commodity charge of $1.30 per MCF is mainly driven by energy costs. The whole operation will employ 5-7 people.
- A thirty year contract with DWSD will lock Flint into hundreds of employees, labor costs and legacy costs.
- The combination of low financing, labor and material make this the optimal time for this investment. At our meeting with the governor on April 19th Detroit acknowledged a second pipeline had to be built.
- KWA could be used as a backup emergency supply for the existing 48 year old pipeline.
- It brings a total economic package to our community i.e. We have the I-69 corridor, I-75 interchange, the rail system connected to Port Huron, and one of the busiest airports in the state. Owning our own water supply completes that package and keeps $25 million in our community.
- Mr. Fausone's continued insistence on a 12 month timeline to calculate the termination fees leaves a question mark on the costs.

Construction Costs

- Rowe/AECOM/J & H $272,000,000
- TYJT $357,000,000

  Include: 10% bond coverage (dispelled)

  30% additional engineering (dispelled)

  Back-up power (dispelled)

- DWSD Starts at: $357,000,000 and adds:

  $134,360,000 for bond sizing

  $11,074,500 for bond sale cost

  For a total of $503,274,500

  Plus need to collect $6,984,000 per year extra for bond coverage 20%)

Now KWA needs:

20% bond coverage

30% additional engineering

38% bond sizing

The KWA dispelled TYJT's numbers; now DWSD starts with those numbers and adds more. They add the same costs to Flint and GCDC construction costs (baseline figures and assumptions – KWA).

Add notes for 8/20/13 WTP meeting

Proposed Scope of Upgrades to Flint WTP

1. Introduction

The City of Flint plans to utilize their existing WTP to provide water on a continuous basis. The city plans to treat water from the Flint River until construction of the proposed KWA supply is complete and the WTP can then be used to treat water from Lake Huron. An evaluation of the WTP to provide treatment of water from both sources is in process to define the scope of upgrades needed to provide reliable service. In addition to the different treatment requirements of each source, the WTP has not been operated on a continuous basis for 40+ years so facilities are also being evaluated to identify equipment which should be replaced because of its age, condition, or obsolescence.

2. Preliminary Scope of Work

Based on the WTP evaluation, the following scope of proposed upgrades has been developed. This summary is preliminary, provided for review and comment by interested parties. Comments received will be used to finalize the scope of work to be implemented at the Flint WTP.

The proposed upgrades have been categorized into two phases. Phase 1 is work that will be completed as soon as practical so that the WTP can be utilized to treat water from the river in 2014. Phase 2 work is needed to provide long-term service with the proposed KWA Lake Huron water source. Phase 2 work will be completed in 2015 to 2016.

Work is proposed to be contracted except where noted "by city" the work is planned to be completed by City staff.

Item 1 – Chemical Systems / Ozone

Additional storage of nitrogen and oxygen will be provided for redundancy and 30 day capacity.

Existing ozone units will be serviced to prepare for continuous operation.

New alternative coagulant chemical feed system will be added for treatment of raw water from Lake Huron.

Phase 1	Phase 2
Oxygen and nitrogen storage	New coagulant feed system
Service existing ozone system (by city)	

need feed system or new coag?

Item 2 – Electrical

The WTP presently uses 2400V as primary power. Power feeders and switchgear are rated at 5kV. Upgrading the primary power to 4160V will enable existing power feeders to provide twice the power and eliminate the need to install new feeder circuits throughout the WTP.

The current substation has two 2.5 MVA transformers running in parallel for a total capacity of 5 MVA. The transformers are obsolete. It is planned that the transformers and conductors to the WTP will be replaced to provide two independent power sources for redundancy. The existing on-site backup power generators are obsolete and inoperable. Since two independent power sources will be provided to the WTP, replacement of the generators is not proposed.

Electrical switch gear and equipment at Pump Station 4 will be replaced.

If filter presses (or other equipment) are utilized for dewatering of softening sludge, a new power feed will be required to the equipment.

Electrical switch gear and equipment at Plant 2 will be replaced.

Phase 1	Phase 2
Upgrade existing substation and power supply	Upgrade power system at Plant 2
Upgrade facilities at Pump Station 4	
Power to filter presses? TBD	

Item 3 – Mid-Point Chlorination

Mid-point chlorination facilities are proposed, including the following principal components:

- Feeders, scales, monitors
- Piping, valves, and controls
- Scrubber
- Ton Containers
-

Phase 1	Phase 2
Mid-point chlorination	

Item 4 – Security Measures

Add three additional security cameras to monitor the following areas:

- Chlorine storage area
- Oxygen and Nitrogen storage area
- East side of WTP property

Phase 1	Phase 2
Additional security cameras (by City)	

Item 5 – Low and High Service Pump Station No. 4

As a result of decreased demands, pumps at Pump Station No. 4 are "over-sized" and do not efficiently operate. Some of the pumps experience vibrations in the shafts and steady bearings. The existing pump station will be rehabilitated to replace "over-sized" pumps and obsolete equipment and provide needed maintenance. Proposed work includes:

- 25 mgd Low Service Pump No. 4 – upgrade motor to inverter duty, rehabilitate pump and piping, install new valve, and install new VFD
- 15 mdg Low Service Pump No. 6 – rehabilitate pump shaft and bearings
- Install two new High Service Pumps (15 mgd @190 feet TH, vertically mounted pumps with 800 HP 2400/4160 V inverter duty motors, with 20 feet of shaft and steady bearings)
- Replacement of existing piping, valves, supports, and bearings
- New intermediate platforms, ladders, & stairs
- New ventilation (for exhausting heat from VFD's)
- Install two medium voltage VFD units
- Demolition of existing equipment to accommodate new equipment

Rehabilitation of Pump Station No. 4 is planned to be completed in two phases. A new high service pump and a new low lift pump will be installed initially to provide efficient service during the period when water from the Flint River is treated. Additional high service and low lift pumps will be installed later to provide long-term reliable, efficient service.

Phase 1	Phase 2
Rehabilitate Pump 6 shaft and bearings (by City)	Rehabilitate 25 mgd Low Service Pump No. 4, new motor, new valve, new VFD
New High Service Pump No. 1	New High Service Pump No. 2
Install VFD for Pump No. 1	Install VFD for Pump No. 2
Provide ventilation for Pump No. 1	Provide ventilation for Pump No. 2
Demolition of existing equipment	Demolition of existing equipment

4 appeal angle in sump ? Double check

Item 6 – Filter Transfer Station

Recent changes in regulations, enhanced CT is required. Additional CT can be provided by including the volume of the Dort Reservoir in the process train. However, because of its elevation with respect to other treatment processes, pumping will be required to utilize the reservoir. The proposed pumping facility will provide for the following:

- Three 12 mgd @ 40 ft TH vertical turbine pumps with 150 HP, 480 V inverter duty motors are planned.
- Valves and Controls
- Ventilation and boiler system
- Three low voltage VFD's
- Power feeders
- MEP
- Piping connections
- 200 feet of 30" water main
- 600 feet of 36" water main
- Site work, paving, & utilities

Can Co → Start new 2015 HP L. Horn Rd to Dort Pump sta. tie to North River & use Cable wire

Phase 1	Phase 2
Filter Transfer Pump Station	

Item 7 – SCADA

As new pumps, chemical systems, and controls are installed; instrumentation and monitoring should be provided. It is proposed that the SCADA network is upgraded to current technology and software and training provided in the initial phase.

Phase 1	Phase 2
SCADA Network Upgrade	SCADA Hardware (Phase 2)
Software and Training	
SCADA Hardware (Phase 1)	

Can't be part of Gen. cont's backup

Item 8 – Raw Water Piping Connection

The proposed KWA raw water pipeline will connect to the existing 72" PCCP finished water supply line near Center and Pierson Roads. (East of this connection, the 72" PCCP will be utilized by GCDC-WWS for distribution of finished water in the GCDC-WWS service area.) Raw water from Lake Huron will be conveyed to the WTP site via the 72" PCCP pipeline. On the WTP site, the 72" pipeline will be tapped for a 42" pipe and for a 36" pipe to convey raw water for treatment. The following work is proposed:

- Piping connections
- 900 feet of 42" water main
- 100 feet of 36" water main
- Roadway and site restoration
- Storm sewer relocation
- Control valve rehabilitation and replacement

Phase 1	Phase 2
	Raw water piping connections

3. Other Items to Address to Finalize Scope of Work

In addition to the upgrades proposed above, the following issues/questions need to be addressed before finalizing the scope of proposed upgrades to the WTP:

a) Options for handling / disposal of lime sludge from softening operations (during period Flint River is water source)
b) Requirements for CT and enhanced treatment
c) Impacts of using river as continuous supply (quantity, quality monitoring & control, reservoir operating levels)
d) Chemical storage options

Prysby, Mike (DEQ)

From:	Prysby, Mike (DEQ)
Sent:	Wednesday, March 20, 2013 12:10 PM
To:	'Daugherty Johnson'
Cc:	bwright@cityofflint.com; Shekter Smith, Liane (DEQ); Bloemker, Jon (DEQ); Benzie, Richard (DEQ); Busch, Stephen (DEQ)
Subject:	KWA Raw Water Capacity - City of Flint

Daugherty,

This email confirms our discussion this morning concerning the possibility of modifying a resolution to purchase 18.0 million gallons per day (MGD) of raw water from the KWA to 15.0 MGD. The MDEQ does not concur with the potential reduction to 15.0 MGD of raw water based on the capacity requirements under the Michigan Safe Drinking Water Act. This volume of raw water will not be sufficient in meeting Flint's maximum day demands (MDD) and the MDEQ will not support a contract between Flint and the KWA that provides only 15.0 MGD of raw water. The MDEQ is also concerned that an 18.0 MGD contract will only be marginal in meeting Flint's MDD. Our concerns are based on the following demand data on record as provided by the city.

- Flint's 5-year average day demand: 13.9 MGD
- Flint's 5-year max day demand: 21.6 MGD

Next, R 325.11204 (1) of the Michigan Safe Drinking Water Act, 1976 PA 399, as Amended and the Administrative Rules require a public water supply to provide sufficient capacity in the waterworks system to meet the finished water supply requirements and, in Flint's case, needs to consist of rated capacity from an approved surface water supply. Flint's capacity needs are also based on treated water; thus the capacity of available raw water will need to be slightly higher (2 to 3 percent) to account for the water needed for production at the treatment plant.

While we understand that Flint's population and water use has declined over the past 10 years, there are other important considerations for providing sufficient source capacity and these include:

- Flint has the potential to fill many existing industrial vacancies over the next 20 years. Additional capacity will be needed to meet this need.
- Potential permit bans and/or connection bans if MDD cannot be met under contracted capacity
- Water use restrictions measures if MDD cannot be met

- Flint needs to plan for future capacity requirements. Most future capacity plans allow for some increase in capacity to allow for expansion of residential, commercial, or industrial customer base
- Flint's 2011 Water Reliability Study's 2030 projected MDD is 24.0 MGD. This MDD is consistent with Flint's most recent water system Sanitary Survey prepared by the MDEQ.

If you have any questions concerning this matter, please call me at your earliest convenience.

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 335-6122 - office
[redacted]

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 335-6122

3 - 8 Hr shifts

OPERATIONS DUTIES

operational duties outline

Operations Foreman

1. Monitor Filter Levels and make Adjustments
2. Back Wash Filters
3. Any Lab Testing Needed
4. Get Samples @ Filters
5. Make Chemical Feed Adjustments

Operator #1 When Not Softening

1. Plate Settler Sludge Pumping
2. Ferric Check Hourly Monitor Ferric Levels and Transfer when needed
3. CL2 Levels add Chlorine when needed
4. Monitor Plant Flow
5. Ferric Deliveries
6. Adjust Rapid Mix and Floc Mixers when needed
7. Get Lab Samples for Plate Settlers and Clarifier and CL2 Residules

Operator #2

1. Monitor and Maintain Oil Levels on Low Services Pump
2. Monitor and Maintain River Intake
3. Run Screens
4. Monitor Chemical Levels for Sodium Thio
5. Mix Sodium Thio
6. Monitor Oxygen Level @ Ozone
7. Monitor Ozone SCFM and % Weight
8. Monitor Plant Flow @ Ozone Contactors
9. Get River Samples
10. Get Ozone Samples and Residules @ Contactors
11. Monitor and Maintain Sodium Biosulfite

OPERATIONS DUTIES (SOFTENING)

Operations Foreman

1. Maintain Filter Levels
2. Back Wash Filters
3. Monitor Polymer Feed
4. Monitor Co2
5. Monitor Fluoride Feed

Operator #1 Softening

1. Plate Settler Sludge Pumping
2. Ferric Hourly Check and Ferric Transfer
3. Cl2 Pellets Level Monitoring & Filling
4. Adjust Rapid Mix and Floc Mixers When Needed
5. Ferric Deliveries
6. Monitor Plant Flow
7. Get Lab Samples for Plate Settlers and Clarifiers
8. Check C12 Levels

Operator #2

1. Monitor and Maintain Oil Levels in Low Service Pumps
2. Check and Clean River Intake
3. Operate Screens When Needed
4. Monitor Sodium Thio and mix Sodium Thio when Needed
5. Check Sodium Biosulfite Levels and Change Barrels when Needed
6. Monitor Oxygen Levels and Nitrogen Levels
7. Check River Flow to Contractors, also SCFM, KW, % Weight hourly
8. Get River Samples
9. Get Ozone Samples and Residules

Operator #3

1. Monitor Lime Slaker and Grit Removal
2. Pump Lime Sludge
3. Monitor Polymer Feed
4. Monitor Co2
5. Monitor Fluoride Feed

Karegnondi Water Authority (KWA)

The counties of Genesee, Lapeer and Sanilac, along with the cities of Flint and Lapeer established the KWA with the objective of utilizing Lake Huron as their primary source of water supply. The KWA, with the GCDC taking the lead, has received a competitive bid of $24.6 million which will allow the KWA to proceed with construction of two water intake cribs one mile into Lake Huron and one 78-inch intake pipeline to provide a capacity of 85 million gallons per day (mgd). The MDEQ – Saginaw Bay District issued the construction permit for the intake pipeline and cribs in August of 2012.

Other major project components will include a pumping station at Lake Huron, approximately 50 miles of 60-inch raw water transmission piping, a 620 Mgal reservoir, and a 36 mgd water treatment plant that will serve Genesee County. Raw water from the KWA will also be available for treatment at the Flint water treatment plant and distribution to the City of Flint. The entire project is expected to be completed and the Genesee County water treatment plant be placed into operation by January 2016. KWA estimates the cost of $272,000,000 for construction of the raw water supply system. The City of Flint and GCDC will also have additional costs for their treatment plants.

Extended WTP Test Run 7/3 - 8/2

7/10/13

1030 - 11AM Final WTP - Test run of WTP thru gravity gravel 5.16 - 17 Mgd 400 shelf + carbon then Both

River 10-25 NTU's
Starting filtering yesterday
NTU's
Applied

Running 5 filters
Running 2.0 MGD L-5 ?
Capacity 17 Based on River Load
If River was 1 Water could get to

HAM drawdown

Hiram CAN to monitor River WTP
Fa Rock For Carbs for Import Intern
Op Think carbs will go to Lagg
→ BY BACK

7/8 WTP RUN → 8/3
week of 7/22 } For COA visit
7/15 - 7/17 } 7/29
start softening
Ramp back down to 12 when softening

7/10/13 WTP Test Run Start & Back Water

Flint WTP Meeting 8/27/13

MDEQ Reqs to WTP op.

2 Phases — Get WTP ready for op.
via Flint River water to EWA
only
2½ – 3 yrs

WTP mtg 8/27/13 @ noon

Phase I — what to do now — ready for Flint
— Short design life if not used for EWA)
Phase II — Lake Huron

Issues:

1 O₂ / NOx tank — no 30 day supply

Providing 1 O₂ tank for O₂ / NOx
readings & 30-day supply

* 30 day supply to stabilize
Lake is supplier's backup 20-30 days
only 2 yrs Rwtn EWA could OK

* Could not maintain Ozone conc. for study
Geo on O3 study, lot N CL₂ demand
Analyzed Algae, Bact EA - Sign
20 mg/L O₂ 2-4 Log conc E coli
get rid of Glycerol / V TTHM

No cog.
Goal/Crypt. → CMOS - Flat-bed
$Zr O_3$ - got crypto
cert for

long term PLAN - mod A CL (ARC ONLY)
& before Dec)

Short-term PLAN to

if SAF Cy cert & not
need DSET for UTL up. → Flat Rock

— Coog Fed there 2 ; if we need
a New coog — poss. changes in Coog.
& maybe some equip changes

Item 2
Outland SUBSTA. Oracle - need help! } See Unicode
& switchgear then UTL A } Proj

* Concern on delays w. CONSTRAINTS on getting
Project done in Cmj w. Process

two indep sources —
* NOEC thought → 2 sep feeds did not help
cost of 2500 sf. 2003 outage
dc vs. 1500 / GEN. 3 (we will look at
En more LAN
acts)

Full GT ok load is ~ 3.6 MVA

Another 2 transformers could not run WTP center

1.5 MG

2 Gen or 2 Gen for Avg. Day - Could run 2 sub stations

Item 3 - out (across w. Dirt)

Item 5

PM1 new 15 MGD H.S. or VFD / Ventilation

PM2 2nd 15 MGD H.S.

Item 6 - not doing

Expansion of 5.9 MG to add new 1/2 of each of added PLCs

Item 7 - SCADA

Item 8 - Raw water connection

- Piping for hard back on incoming line

Now could use

Sludge - Gravity Road out

- Oval settling basins in WTC 2 w. end of

- behind Hole process (trays, studies) settling basins or conveyor system

- pump in / pump out separate → Low item 5

F. Hor re-cycle mbr if recycle
1 no decant water

SIZE
may be more cost-effective to build temp
Pressas & test out
Bio Read - not option
- Primary need to form a better sol'n for
Organon

Pot UV units - Photo II unit upgrade 2003
report
II or Sonics ? - cld fit the trans steriwaths
Doot - P.P.g not installed
as was furnished

UV can go in II
if cryptosporidium - validated units → ± IRMS
Dorney, UK

P for cost → All approved EM/Trans & how this
make outs - will this get approved?

Recirc — Above
take Doot out
Cost of O2/NaOCl $?
Eff. from — energy losses VS potential yield
need Cl_2 out
Security - IN

Seal at valves

P.S. ingress cut - ok

Imm 6 - out

SCADA -

Other Lime Sludge

Mod Pt Cl_2 in WTP to repl. 1 det feeder

- Ito-8 - solenoid in plug connection

Move Odet (int. P.S. transducer) to Mod 2

(* - Get refresh adj for review) -

18 = 12.5 ● 5cm

07 $\frac{3,000 \text{ N}}{12,500 \text{ cm}} = 240 \text{ N.N}$

$T_{20} = 0.25(240 \text{ N.N}) = 57.2 \text{ N.N}$

$\zeta = 1.0 < 57.2 \text{ N.N} = 57.2 \text{ N.N-m/A}$

ζ need 0 $\frac{1}{2}$ kg cm (0.5 C in 9.0 cm 1.0)
is 73 N.N-m/A

Enclosing ratio $57.2 / 73 = 0.78$

$\frac{\text{Energy}}{\text{Energy}} = 0.5 \times 0.72 = 0.36$

.559

$\frac{33.2}{146} = .23$

$\frac{\text{45 Fe 1 Log}}{N_2}$

$\frac{G2}{T37} =$

.4K

Tues 7/16

not softening yet

CO_2 supplier — can't deliver LO_2
till one of tech. to inject tank
— hydro Tuesday for inj. Post inject well

Gonna shut down on BW
switched filter on SAT

Filter (3,4,5,6,8)
(7,9,10,11,12)

Time to Monday

Mon

Still no softening — still no CO_2 - Supplier ok.
but no tech. to make injection

Tk/FR:
Shut down - BW on all 10 Filters -

- new numbers (7,10,11,12) → LOMSD RMC

No pH control set-up → split treatment
line to Δ Cl_2 point

Will estab dual feeds - Ect need to add on WTP
(Already has dual feed or consumer side) Grounds

7/28 – started softening @ 10:19
Running very well

7/29 – Blanket was good thru SAT 7/27
Mud to Church 5:15 → 2nd s/c & blanket
hold up issue (temp)

actual goal up / known lost blanket – carry over
to Pilcrow – stupid Lifting
– saving carry over to overall → NADES
Tomo
– hoping to recover blanket today

Step 6

(46) 143-034

(51) 510

3507

BK

(787) 653-7

(609) 9C-0355

(2-6)

1 Schenley = 10 AM

900

R+A 1400

Dolby Blvd & 7th

Exit

Ozone cleaning - need cable
reel to cut for full-time, SAM by Ellis em
need to
- Reply drawn valve on 1mc 20 cut
- Any red wire - still be hot to
disposal line and ground to wire
to fans

- CAN Input - 2 clo to
MATER wire cable need KWH/Gallon scale
- New SVB Sub.
- Main transfer - w dual Deck
- Consumers Energy put to the Outlet
- Kat Fill is on wtp grounds -
- P.S. to DUET reuse
- Ms Scale - w VFDs
- Main all elements
- East Monitor Diaster (8/1)

Flat
wtp
end cil w. cut tank 8/2
- Give all day training 1330
- Then hands-on for not RUN - Pump out
to 11

LAN Report

Jim Filling @ Rose

WTP improvements
Missing challenges
Residuals
} challenges to ideas w/ MDEQ input

Iron out Plan for city
technical
Financial Plan

working documents of LAN Report
& work with us on Report

Warren Green's cell — MT
630-918-8494 — workshop early April

Set Date —

Steve - M 3pm ish W-OK
Jon - M AM ish W-ok
PAT - M-OK W-X

Prysby, Mike (DEQ)

From: Dan Potter <potter@twp.grand-blanc.mi.us>
Sent: Thursday, June 20, 2013 10:31 AM
To: Prysby, Mike (DEQ)
Subject: Grand Blanc Reliability Study

Mike,

We didn't address your comment no. 8 in the Reliability study, but there are only two interconnects between the City and Township at the locations noted in the report.
There is no interconnect in Kings Pointe.

Thanks,
Dan

WTP — short-term supply
& ready for EWA
& OUTAGE for MDEQ
feedback

Prysby, Mike (DEQ)

From: Daugherty Johnson <djohnson@cityofflint.com>
Sent: Thursday, April 24, 2014 12:03 PM
To: Prysby, Mike (DEQ); Busch, Stephen (DEQ); Howard Croft
Subject: DWSD back up agreement

Follow Up Flag: Flag for follow up
Flag Status: Flagged

Hello Steve and Mike. As you are aware, the City has undergone extensive upgrades to our Water Treatment Plant and it's associated facilities. Our intentions and efforts have been to operate our facility as the primary drinking water source for the City of Flint. Through consultation with your office and our engineering firm we've developed a system of redundant electrical systems, treatment processes and adequate finished water storage to negate the need for a signed back up agreement with DWSD due to their termination of our contract. Upon inspection of these facilities would you convey your concurrence that there is no regulatory requirement for us to sign a back up agreement with DWSD.

Thank you
Daugherty Johnson
Utilities Administrator
City of Flint

OFFICE OF THE MAYOR
City Hall
1101 S. Saginaw Street
Flint, Michigan 48502

WATER QUALITY ADVISORY COMMITTEE

CITY OF FLINT

OFFICE OF THE EMERGENCY MANAGER

Gerald Ambrose
Emergency Manager

TO: Wayne Workman, Deputy Treasurer
Treasury Department
State of Michigan

FROM: Jerry Ambrose, Emergency Manager
City of Flint

DATE: March 3, 2015

As the Emergency Manager for the City of Flint, I am charged with restoring the City government to financial solvency, and working to assure that the City moves forward on a financially sustainable basis. The steps taken over the past three years have been difficult. Taxes and fees have been raised, services and workforce reduced, and ongoing costs, including legacy costs, have been constrained.

The current controversy surrounding the provision of water, and the path for resolution, has a potentially significant impact on the progress that is being made. I am satisfied that the water provided to Flint users today is within all MDEQ and EPA guidelines, as evidenced by the most recent water quality results conducted for MDEQ. We have a continuing commitment to maintain water safety and to improve water quality, and have dedicated resources to assure this commitment will be made.

The oft-repeated suggestion that the City should return to DWSD, even for a short period of time, would, in my judgment, have extremely negative financial consequences to the water system, and consequently to the rate payers. By the most conservative estimates, such a move would increase costs by at least $12 million annually, with that amount achieved only by eliminating virtually all budgeted improvements in the system. For a system with Unrestricted Assets of only $740,745, according to the June 30, 2014 audited financial statements, the only recourse within the City's control would be to increase revenues significantly. And in my judgment, that would come from raising rates for water by 30% or more . Further, changing the *source* of the city's water would not necessarily change any of the *aesthetics* of the water, including odor and discoloration, since those appear to be directly related to the aging pipes and other infrastructure that carry water from the treatment facility to our customers.

This direction of discussion also deviates from what, in my judgment, should be the focus: How can we not only operate and maintain a system to assure the delivery of safe and quality water dependably, but significantly reduce the cost of water and sewer to the users? At an average of $149 per month for water and sewer service for a residential user, the cost is extremely high in comparison to surrounding areas, as well as most areas across the state, and creates a significant financial burden for many users. In my judgment, we should all be concentrating on how to reduce rates by 50% or more. Unfortunately, there are no easy or evident answers, and continuation of the status will be an impediment to the sustainable recovery of the City of Flint. It is a conversation that I expect we will have with the recently created Water Quality Advisory Committee.

My reasoning for this conclusion is as follows:

One of the decisions made in the context of beginning to eliminate deficits and to restore financial stability to the City of Flint was to increase water and sewer rates significantly – the only choice available to financially stabilize a system that as of June 30, 2012, had a deficit of $8,758,091. Another was to leave DWDS for the KWA because it offered the opportunity to lower future rate increases. A third decision was to utilize the Flint River on an interim basis when DWSD unilaterally terminated the City's contract for water purchase. That decision was made because it also offered an immediate cost savings opportunity which translated into the ability to upgrade the Water Treatment Plant without having to seek financing. It was a reasonable decision because of our experience in using the river in a back-up capacity, including test runs on a quarterly basis for several decades.

Unfortunately, the switch to the river as a primary source was more challenging than anticipated, and the harsh winter of 2013-2014 resulted in much more damage to the aging water infrastructure than in previous years. The result was the issuance of required notices that water exceeded established guidelines for safety as it could affect certain vulnerable populations, and some users of the system experienced unpleasant odors and discoloration. Some users also appeared to have had some negative reactions to the new source of water. However, as soon as the test results were known, City staff took immediate actions to address the concerns. These actions are evidenced today by the fact that MDEQ has certified that our most recent testing shows water from all testing sites to be well within acceptable guidelines. Additionally, the City is continuing to taking the necessary actions to assure that the water supply remains safe and that water quality continues to improve.

As the City has moved to address the situation, the suggestion continues to be made that the City should re-engage with DWSD and purchase water at least until the KWA pipeline is supplying water. As evidenced by the most recent letter from DWSD, such a decision would immediately increase the City's cost by $846,700 per month, or $10,160,400 per year, just for the fixed cost portion of the price. The actual *purchase* of water would be an additional fee, and dependent upon

the quantity purchased. We estimate the actual water purchase cost to average more than $1 million per month, for a grand total of approximately $22 million per year. Finally, the DWSD offer is conditioned upon the City (or presumably the KWA) agreeing to negotiate a long term contract (30 years) for back-up.

The $22 million annual estimate of increased costs to purchase water from DWSD would be minimally offset by an approximate $3 million in reduced operating costs, and could be further offset by an additional $9 million, but only if all funding for capital improvements to the system are eliminated. To eliminate all funding dedicated to repairing, stabilizing, and improving the system would be totally irresponsible and would have long term negative consequences to the City and to future rate payers.

As you are aware we have recently brought in outside expert assistance to evaluate the steps we have taken to assure that the water is safe and to continue to improve water quality. We are expecting specific recommendations within the next few weeks, and are committed to implementing those recommendations in a timely manner. Many steps have already been taken. I am confident that implementing their recommendations will assure a continuing supply of safe water as well as improved quality, and at far less cost than re-engaging DWSD.

We have also created a 40-member Water Advisory Committee and a 13-member Technical Advisory Committee to assure two-way communication with the public and users of the system. Those committees will begin to meet this week, and we look forward to answering their questions and receiving their input.

It is unfortunate that problems and concerns with quality have arisen, and we are working every day to address the issues that caused them. Maintaining safe water and improving quality is a top priority as we work to make the City of Flint an attractive place to live, work, study, and play.

02/09/2015

UTILITITY WIDE WATER FUND PROFESSIONAL SERVICES
PERIOD ENDING 02/28/2015

ACCOUNT	DESCRIPTION	2014-15 AMENDED BUDGET	ACTIVITY FOR MONTH 02/28/2015	YTD BALANCE 02/28/2015		ENCUMBERED YEAR-TO-DATE		UNENCUMBERED BALANCE	% BDGT USED
Dept 536.100-Utilities - Water Administration									
Fund 591 - Water Fund									
801.000	**Professional Service**	2,320,000.00	50,418.75	537,844.65		348,549.88		1,433,605.47	38.21
	ROWE City Engineering				contract	$ 79,000.00			
	Dump Site Analysis				contract	$ 42,892.00			
	LAN Water Implementation				contract	$ 244,900.00			
	JFA /U.S. Dept Interior						$	27,295.00	
	Raftelis Financial Update						$	23,810.00	
	Bray Road						$	500,000.00	
	TTHM Violation Letters/Mailings						$	25,000.00	
	MDEQ Permit Fees						$	100,000.00	
	Energy Costs/Performance Contracts						$	250,000.00	
	Veolia Water Consultant						$	40,000.00	
	City Works/Assest Management						$	350,000.00	
	Operational Contingency						$	117,500.00	
Total Dept 536.100-Utilities - Water Administration						$ 366,792.00	$	1,433,605.00	
Dept 540.100-Water Service Line Management									
Fund 591 - Water Fund									
801.000	**Professional Service**	374,400.00	0.00	74,877.03		250,869.51		48,653.46	87.00
	Sewerlines Cty Engineering				contract	$ 190,000.00			
	Internal Investigations				contract	$ 95,645.22			
	Landfill Services						$	12,500.00	
	Janitorial Services						$	4,260.00	
	After Hours Water & Staking						$	2,500.00	
	Line Stopping						$	25,000.00	
						285,645.22		44,260.00	

Dept 540.202-Wsc-Water Distribution Maint.

Fund 591 - Water Fund

801.000	**Professional Service**	60,000.00	0.00	0.00	500.00		59,500.00	0.83
	Fire Extinguisher Services			contract	500.00			
					500.00			
		Balance is being used for budget adjustment to cover overruns for garage charges						
	Current garage overruns is $100,000.00						59,500.00	

Dept 540.300-Capital Improvement

Fund 591 - Water Fund

801.000	**Professional Service**	2,660,000.00	0.00	0.00	60,000.00		2,600,000.00	2.26
	Water Meters			contract	60,000.00			
	Water Main Replacement Iroquois					$	2,500,000.00	
	Valve Exercising					$	100,000.00	
Total Dept 540.300-Capital Improvement					$ 60,000.00	$	2,600,000.00	

Dept 545.200-Water Plant - Operations

Fund 591 - Water Fund

801.000	**Professional Service**	80,000.00	0.00	8,866.98	10,323.02		60,810.00	23.99
	Lab Testing			contract	10,323.02			
	Dam Inspections					$	11,500.00	
	Comprehensive Reulatory Compliance					$	40,000.00	
	Lab Proficiency Testing					$	6,000.00	
	All Max Data Support					$	2,500.00	
Total Dept 545.200-Water Plant - Operations					$ 10,323.02	$	60,000.00	

Dept 545.201-Water Plant Maintenance

Fund 591 - Water Fund

801.000	**Professional Service**	26,000.00	0.00	3,700.00	12,955.00		9,345.00	64.06
	Vibration Analysis			contract	$ 5,500.00			
	Elevator Inspections & Services			contract	$ 2,455.00			
	Diving for Dams Inspection			contract	$ 5,000.00			
	RPZ Inpsection & Repair					$	4,000.00	
	Generator Inspection & Services					$	5,000.00	
Total Dept 545.201-Water Plant Maintenance		26,000.00	0.00	3,700.00	$ 12,955.00	$	9,000.00	64.06

Dept 545.300-Water Plant - Capital Improvements

Fund 591 - Water Fund

801.000	Professional Service	2,900,000.00	0.00	927,088.07		1,296,474.81	676,427.12	76.67
	Installation of Storage Tanks			contract	$	716,272.00		
	Motor Control Upgrade			contract	$	440,157.00		
	Easement- Electrical Grounding			contract	$	4,054.00		
	Lime Residual			contract	$	135,991.81		
	Cedar Street Pumpt Station						$ 500,000.00	
	Pump Station Feeder						$ 125,000.00	
	TTHM Operationial Evaluation						$ 50,000.00	
Total Dept 545.300-Water Plant - Capital Improvements		2,900,000.00	0.00		$	1,296,474.81	$ 675,000.00	76.67

Total	Budgeted	YTD Balance	Encumbered	Unencumbered
	$8,420,400.00	$1,552,386.73	$2,032,690.05	$4,821,865.00

WATER FUND EXPENSES

GL NUMBER	DESCRIPTION	2013-14 ACTIVITY	2014-15 AMENDED BUDGET	2015-16 APPROVED BUDGET	2015-16 BUDGET CHANGES FOR DWSD	2015-16 BUDGET CHANGES FOR DWSD	STATUS QUO REVISED 2015-16 BUDGET WITH DWSD	2015-16 BUDGET CHANGES WITH DWSD & ALL CAPITAL FUNDING ELIMINATED
Expenses - Water Fund								
Dept 536.100-Utilities - Water Administration								
	Wages and Fringes	$76,155	$528,777	$445,851			$445,851	
	Repairs and Improvements	$2,497,397	$2,320,000	$2,320,000		$0	$2,320,000	($2,320,000)
	Other Expenses	$2,295,410	$2,248,750	$2,248,750			$2,248,750	
Dept 540.100-Water Service Center Management								
	Wages and Fringes	$199,883	$228,451	$256,343			$256,343	
	Repairs and Improvements	$140,599	$374,400	$350,000		$0	$350,000	($350,000)
	Other Expenses	$106,780	$477,292	$547,649		$0	$547,649	
Dept 540.200-Wsc-Meter Reading - Water								
	Wages and Fringes	$439,351	$488,365	$481,316		$0	$481,316	
	Other Expenses	$151,894	$64,000	$64,000		$0	$64,000	
Dept 540.202-Wsc-Water Distriburion Mains								
	Wages and Fringes	$2,383,598	$3,006,530	$3,024,627		$0	$3,024,627	
	Repairs and Improvements	$391	$60,000	$85,000		$0	$85,000	($85,000)
	Other	$1,210,118	$920,457	$849,500		$0	$849,500	
Dept 545.200-Water Plant - Operations								
	Wages and Fringes	$988,528	$1,827,009	$1,761,027	Staffing	($376,098)	$1,384,929	
	Repairs and Improvements	$48,723	$80,000	$60,000			$60,000	($60,000)
	Supplies, Utilities and Other	$22,779,389	$3,445,656	$3,318,656			$23,960,446	
					Fixed Charge DWSD	$10,160,400		
					Commodity Chg DWSD	$12,818,190		
					Chemical Purchase	($1,486,800)		
					Electrical Power	($850,000)		
Dept 545.202-Water Plant - Dam Operations		$119,216	$0	$0			$0	
Dept 545.203-Water Plant - Dam Maintenance		$126,623	$0	$0			$0	
Dept 545.300-Water Plant - Capital Improvements								
	Repairs and Improvements	$968,315	$2,900,000	$1,200,000			$1,200,000	($1,200,000)
	Other	$980,161	$3,700,000	$2,400,000			$2,400,000	
Dept 900.100-Cost Allocation and Retiree Healthcare		$3,111,662	$5,600,242	$6,077,577			$6,077,577	
Dept 966.101-PILOT Payment		$1,190,000	$1,130,000	$1,130,000			$1,130,000	
Dept 966.493-Debt Service		$2,638,071	$2,638,071	$2,638,071			$2,638,071	
Dept 540.300-Capital Improvement								
	Repairs and Improvements	$0	$2,660,000	$2,660,000			$2,660,000	($2,660,000)
	Other	$0	$530,000	$530,000			$530,000	
Dept 233.100-Purchasing	Wages and Fringes	$63,263	$0	$29,313			$29,313	
Dept 253.202-Bad Debt Expense		$161,939	$0	$0			$0	

Dept 535.206-Utilities - Water Cross Connection Prog		$100,314	$109,585	$108,182			$108,182	
Dept 545.201-Water Plant Maintenance								
	Wages and Fringes	$1,095,567	$1,147,848	$1,327,386				
	Repairs and Improvements	$8,142	$26,000	$26,000			$1,327,586	
	Other	$420,540	$671,349	$685,000			$26,000	
591-536.100-990.209	KWA Operation Payment	$0	$584,000	$584,000			$686,000	
	Reserve	$0		$1,875,750			$584,000	
							$1,875,750	
Total Expenses		$44,210,032	$37,767,035	$37,886,000	$20,265,692	$58,151,692		$48,576,942

WATER FUND REVENUES

GL NUMBER	DESCRIPTION	2013-14 ACTIVITY	2014-15 AMENDED BUDGET	2015-16 APPROVED BUDGET	2015-16 BUDGET CHANGES FOR DWSD	STATUS QUO REVISED 2015-16 BUDGET WITH DWSD	Inc	2015-16 BUDGET CHANGES WITH DWSD & ALL CAPITAL FUNDING ELIMINATED	Inc
Revenues: Water Fund									
	Meter Water Sales	$42,132,946	$37,000,000	$37,000,000	$20,265,692	$57,265,692	55%	$48,576,942	31%
	Other Revenues	$1,589,155	$886,000	$886,000	$0	$886,000		$886,000	
	Asset Sale	$3,493,743	$0	$0	$0	$0		$0	
	Carry Over	$0	$3,263,505	$0	$0	$0		$0	
Total Revenues		$47,215,844	$41,149,505	$37,886,000	$20,265,692	$58,151,692		$48,576,942	

CITY OF FLINT

OFFICE OF THE EMERGENCY MANAGER

Gerald Ambrose
Emergency Manager

TO: Wayne Workman, Deputy Treasurer
Treasury Department
State of Michigan

FROM: Jerry Ambrose, Emergency Manager
City of Flint

DATE: March 3, 2015

As the Emergency Manager for the City of Flint, I am charged with restoring the City government to financial solvency, and working to assure that the City moves forward on a financially sustainable basis. The steps taken over the past three years have been difficult. Taxes and fees have been raised, services and workforce reduced, and ongoing costs, including legacy costs, have been constrained.

The current controversy surrounding the provision of water, and the path for resolution, has a potentially significant impact on the progress that is being made. I am satisfied that the water provided to Flint users today is within all MDEQ and EPA guidelines, as evidenced by the most recent water quality results conducted for MDEQ. We have a continuing commitment to maintain water safety and to improve water quality, and have dedicated resources to assure this commitment will be made.

The oft-repeated suggestion that the City should return to DWSD, even for a short period of time, would, in my judgment, have extremely negative financial consequences to the water system, and consequently to the rate payers. By the most conservative estimates, such a move would increase costs by at least $12 million annually, with that amount achieved only by eliminating virtually all budgeted improvements in the system. For a system with Unrestricted Assets of only $740,745, according to the June 30, 2014 audited financial statements, the only recourse within the City's control would be to increase revenues significantly. And in my judgment, that would come from raising rates for water by 30% or more . Further, changing the *source* of the city's water would not necessarily change any of the *aesthetics* of the water, including odor and discoloration, since those appear to be directly related to the aging pipes and other infrastructure that carry water from the treatment facility to our customers.

This direction of discussion also deviates from what, in my judgment, should be the focus: How can we not only operate and maintain a system to assure the delivery of safe and quality water dependably, but significantly reduce the cost of water and sewer to the users? At an average of $149 per month for water and sewer service for a residential user, the cost is extremely high in comparison to surrounding areas, as well as most areas across the state, and creates a significant financial burden for many users. In my judgment, we should all be concentrating on how to reduce rates by 50% or more. Unfortunately, there are no easy or evident answers, and continuation of the status will be an impediment to the sustainable recovery of the City of Flint. It is a conversation that I expect we will have with the recently created Water Quality Advisory Committee.

My reasoning for this conclusion is as follows:

One of the decisions made in the context of beginning to eliminate deficits and to restore financial stability to the City of Flint was to increase water and sewer rates significantly – the only choice available to financially stabilize a system that as of June 30, 2012, had a deficit of $8,758,091. Another was to leave DWDS for the KWA because it offered the opportunity to lower future rate increases. A third decision was to utilize the Flint River on an interim basis when DWSD unilaterally terminated the City's contract for water purchase. That decision was made because it also offered an immediate cost savings opportunity which translated into the ability to upgrade the Water Treatment Plant without having to seek financing. It was a reasonable decision because of our experience in using the river in a back-up capacity, including test runs on a quarterly basis for several decades.

Unfortunately, the switch to the river as a primary source was more challenging than anticipated, and the harsh winter of 2013-2014 resulted in much more damage to the aging water infrastructure than in previous years. The result was the issuance of required notices that water exceeded established guidelines for safety as it could affect certain vulnerable populations, and some users of the system experienced unpleasant odors and discoloration. Some users also appeared to have had some negative reactions to the new source of water. However, as soon as the test results were known, City staff took immediate actions to address the concerns. These actions are evidenced today by the fact that MDEQ has certified that our most recent testing shows water from all testing sites to be well within acceptable guidelines. Additionally, the City is continuing to taking the necessary actions to assure that the water supply remains safe and that water quality continues to improve.

As the City has moved to address the situation, the suggestion continues to be made that the City should re-engage with DWSD and purchase water at least until the KWA pipeline is supplying water. As evidenced by the most recent letter from DWSD, such a decision would immediately increase the City's cost by $846,700 per month, or $10,160,400 per year, just for the fixed cost portion of the price. The actual *purchase* of water would be an additional fee, and dependent upon

the quantity purchased. We estimate the actual water purchase cost to average more than $1 million per month, for a grand total of approximately $22 million per year. Finally, the DWSD offer is conditioned upon the City (or presumably the KWA) agreeing to negotiate a long term contract (30 years) for back-up.

The $22 million annual estimate of increased costs to purchase water from DWSD would be minimally offset by an approximate $3 million in reduced operating costs, and could be further offset by an additional $9 million, but only if all funding for capital improvements to the system are eliminated. To eliminate all funding dedicated to repairing, stabilizing, and improving the system would be totally irresponsible and would have long term negative consequences to the City and to future rate payers.

As you are aware we have recently brought in outside expert assistance to evaluate the steps we have taken to assure that the water is safe and to continue to improve water quality. We are expecting specific recommendations within the next few weeks, and are committed to implementing those recommendations in a timely manner. Many steps have already been taken. I am confident that implementing their recommendations will assure a continuing supply of safe water as well as improved quality, and at far less cost than re-engaging DWSD.

We have also created a 40-member Water Advisory Committee and a 13-member Technical Advisory Committee to assure two-way communication with the public and users of the system. Those committees will begin to meet this week, and we look forward to answering their questions and receiving their input.

It is unfortunate that problems and concerns with quality have arisen, and we are working every day to address the issues that caused them. Maintaining safe water and improving quality is a top priority as we work to make the City of Flint an attractive place to live, work, study, and play.

02/09/2015

UTILITITY WIDE WATER FUND PROFESSIONAL SERVICES
PERIOD ENDING 02/28/2015

ACCOUNT	DESCRIPTION	2014-15 AMENDED BUDGET	ACTIVITY FOR MONTH 02/28/2015	YTD BALANCE 02/28/2015	ENCUMBERED YEAR-TO-DATE	UNENCUMBERED BALANCE	% BDGT USED
Dept 536.100-Utilities - Water Administration							
Fund 591 - Water Fund							
801.000	**Professional Service**	2,320,000.00	50,418.75	537,844.65	348,549.88	1,433,605.47	38.21
	ROWE City Engineering			contract	$ 79,000.00		
	Dump Site Analysis			contract	$ 42,892.00		
	LAN Water Implementation			contract	$ 244,900.00		
	JFA /U.S. Dept Interior					$ 27,295.00	
	Raftelis Financial Update					$ 23,810.00	
	Bray Road					$ 500,000.00	
	TTHM Violation Letters/Mailings					$ 25,000.00	
	MDEQ Permit Fees					$ 300,000.00	
	Energy Costs/Performance Contracts					$ 250,000.00	
	Veolia Water Consultant					$ 40,000.00	
	City Works/Assest Management					$ 350,000.00	
	Operational Contingency					$ 117,500.00	
Total Dept 536.100-Utilities - Water Administration					$ 366,792.00	$ 1,433,605.00	
Dept 540.100-Water Service Center Management							
Fund 591 - Water Fund							
801.000	**Professional Service**	374,400.00	0.00	74,877.03	250,869.51	48,653.46	87.00
	Sewerlines Cty Engineering			contract	$ 190,000.00		
	Internal Investigations			contract	$ 95,645.22		
	Landfill Services					$ 12,500.00	
	Janitorial Services					$ 4,260.00	
	After Hours Water & Staking					$ 2,500.00	
	Line Stopping					$ 25,000.00	
					285,645.22	44,260.00	

Dept 540.202-Wtr Wate Dist Service Maint

Fund 591 - Water Fund

801.000	**Professional Service**	60,000.00	0.00	0.00	500.00	59,500.00	0.83
	Fire Extinguisher Services			contract	500.00		
					500.00		
				Balance is being used for budget adjustment to cover overruns for garage charges			
	Current garage overruns is $100,000.00					**59,500.00**	

Dept 540.300-Capital Improvement

Fund 591 - Water Fund

801.000	**Professional Service**	2,660,000.00	0.00	0.00	60,000.00	2,600,000.00	2.26
	Water Meters			contract	60,000.00		
	Water Main Replacement Iroquois					$ 2,500,000.00	
	Valve Exercising					$ 100,000.00	
Total Dept 540.300-Capital Improvement					$ **60,000.00**	$ **2,600,000.00**	

Dept 545.200-Water Plant - Operations

Fund 591 - Water Fund

801.000	**Professional Service**	80,000.00	0.00	8,866.98	10,323.02	60,810.00	23.99
	Lab Testing			contract	10,323.02		
	Dam Inspections					$ 11,500.00	
	Comprehensive Reulatory Compliance					$ 40,000.00	
	Lab Proficiency Testing					$ 6,000.00	
	All Max Data Support					$ 2,500.00	
Total Dept 545.200-Water Plant - Operations					$ **10,323.02**	$ **60,000.00**	

Dept 545.201-Water Plant Maintenance

Fund 591 - Water Fund

801.000	**Professional Service**	25,000.00	0.00	3,700.00	12,955.00	9,345.00	64.06
	Vibration Analysis			contract	$ 5,500.00		
	Elevator Inspections & Services			contract	$ 2,455.00		
	Diving for Dams Inspection			contract	$ 5,000.00		
	RPZ Inpsection & Repair					$ 4,000.00	
	Generator Inspection & Services					$ 5,000.00	
Total Dept 545.201-Water Plant Maintenance		26,000.00	0.00	3,700.00	$ **12,955.00**	$ **9,000.00**	64.06

Dept 545.300-Water Plant - Capital Improvements

Fund 591 - Water Fund

801.000	**Professional Service**	2,900,000.00	0.00	927,098.07		1,296,474.81	676,427.12	76.67
	Installation of Storage Tanks			contract	$	716,272.00		
	Motor Control Upgrade			contract	$	440,157.00		
	Easement- Electrical Grounding			contract	$	4,054.00		
	Lime Residual			contract	$	135,991.81		
	Cedar Street Pumpt Station						$ 500,000.00	
	Pump Station Feeder						$ 125,000.00	
	TTHM Operationial Evaluation						$ 50,000.00	
Total Dept 545.300-Water Plant - Capital Improvements		2,900,000.00	0.00		$	1,296,474.81	$ 675,000.00	76.67

Total	Budgeted	YTD Balance	Encumbered	Unencumbered
	$8,420,400.00	$1,552,386.73	$2,032,690.05	$4,821,865.00

WATER FUND EXPENSES

GL NUMBER	DESCRIPTION	2013-14 ACTIVITY	2014-15 AMENDED BUDGET	2015-16 APPROVED BUDGET	2015-16 BUDGET CHANGES FOR DWSD	2015-16 BUDGET CHANGES FOR DWSD	STATUS QUO REVISED 2015-16 BUDGET WITH DWSD	2015-16 BUDGET CHANGES WITH DWSD & ALL CAPITAL FUNDING ELIMINATED
Expenses - Water Fund								
Dept 536.100-Utilities - Water Administration								
	Wages and Fringes	$76,155	$528,777	$445,851			$445,851	
	Repairs and Improvements	$2,497,397	$2,320,000	$2,320,000		$0	$2,320,000	($2,320,000)
	Other Expenses	$2,295,410	$2,248,750	$2,248,750			$2,248,750	
Dept 540.100-Water Service Center Management								
	Wages and Fringes	$199,883	$228,451	$256,343			$256,343	
	Repairs and Improvements	$140,599	$374,400	$350,000		$0	$350,000	($350,000)
	Other Expenses	$106,780	$477,292	$547,649		$0	$547,649	
Dept 540.200-Wsc-Meter Reading - Water								
	Wages and Fringes	$439,351	$488,365	$481,316		$0	$481,316	
	Other Expenses	$151,894	$64,000	$64,000		$0	$64,000	
Dept 540.202-Wsc-Water Distribution Mains								
	Wages and Fringes	$2,383,598	$3,006,530	$3,024,627		$0	$3,024,627	
	Repairs and Improvements	$391	$60,000	$85,000		$0	$85,000	($85,000)
	Other	$1,210,118	$920,457	$849,500		$0	$849,500	
Dept 545.200-Water Plant - Operations								
	Wages and Fringes	$988,528	$1,927,003	$1,761,027	Staffing	($376,098)	$1,384,929	
	Repairs and Improvements	$48,723	$80,000	$60,000			$60,000	($60,000)
	Supplies, Utilities and Other	$21,779,389	$3,445,656	$3,318,656			$23,960,446	
					Fixed Charge DWSD	$10,150,400		
					Commodity Chg DWSD	$12,818,190		
					Chemical Purchase	($1,186,800)		
					Electrical Power	($850,000)		
Dept 545.202-Water Plant - Dam Operations		$119,216	$0	$0			$0	
Dept 545.203-Water Plant - Dam Maintenance		$126,629	$0	$0			$0	
Dept 545.300-Water Plant - Capital Improvements								
	Repairs and Improvements	$968,815	$2,900,000	$1,200,000			$1,200,000	($1,200,000)
	Other	$980,161	$3,700,000	$2,400,000			$2,400,000	
Dept 900.100-Cost Allocation and Retiree Healthcare		$3,111,662	$5,600,242	$6,077,577			$6,077,577	
Dept 966.101-PILOT Payment		$1,130,000	$1,130,000	$1,130,000			$1,130,000	
Dept 966.493-Debt Service		$2,638,071	$2,638,071	$2,638,071			$2,638,071	
Dept 540.300-Capital Improvement								
	Repairs and Improvements	$0	$2,660,000	$2,660,000			$2,660,000	($2,660,000)
	Other	$0	$530,000	$530,000			$530,000	
Dept 233.100-Purchasing	Wages and Fringes	$63,263	$0	$29,313			$29,313	
Dept 253.202-Bad Debt Expense		$161,939	$0	$0			$0	

Dept 530.206-Utilities - Water Cross Connection Prog		$105,318	$109,945	$108,182		$108,182		
Dept 545.201- Water Plant Maintenance								
	Wages and Fringes	$1,063,967	$1,147,846	$1,127,886		$1,127,886		
	Repairs and Improvements	$8,142	$26,000	$26,000		$26,000		
	Other	$420,940	$671,340	$689,000		$689,000	($50,000)	
591-538.100-250.209	KWA Operation Payment	$0	$584,000	$584,000		$584,000		
	Reserve	$0		$2,878,750		$2,878,750		
							($2,878,750)	
Total Expenses		**$44,210,032**	**$37,767,035**	**$37,886,000**	**$20,265,692**	**$58,151,692**	**$48,576,942**	

WATER FUND REVENUES

GL NUMBER	DESCRIPTION	2013-14 ACTIVITY	2014-15 AMENDED BUDGET	2015-16 APPROVED BUDGET	2015-16 BUDGET CHANGES FOR DWSD	STATUS QUO REVISED 2015-16 BUDGET WITH DWSD	Inc.	2015-16 BUDGET CHANGES WITH DWSD & ALL CAPITAL FUNDING ELIMINATED	Inc.
Revenues: Water Fund									
	Meter Water Sales	$42,132,946	$37,000,000	$37,000,000	$20,265,692	$57,265,692	55%	$48,576,942	31%
	Other Revenues	$1,589,155	$886,000	$886,000	$0	$886,000		$886,000	
	Asset Sale	$3,493,743	$0	$0	$0	$0		$0	
	Carry Over	$0	$3,263,505	$0	$0	$0		$0	
Total Revenues		**$47,215,844**	**$41,149,505**	**$37,886,000**	**$20,265,692**	**$58,151,692**		**$48,576,942**	

City of Flint

Water System Update

With

Questions & Answers

February 16, 2015

* CITY HALL, 1101 S. SAGINAW STREET, RM 8105, FLINT, MICHIGAN 48502 (810) 766-7135 Fax (810) 766-7249 *

CITY OF FLINT

Department of Public Works

Dayne Walling
Mayor

Gerald Ambrose
Emergency Manager

Howard Croft
Director

TO: Flint City Residents

FROM: Howard Croft, DPW Director

RE: **Water Questions**

DATE: February 16, 2015

Over recent weeks the City of Flint has taken a number of measures to increase both the quality of water and the availability of information. Monthly Operating Reports are posted online approximately 15 days following the end of each month, a summary report is also posted with additional information of utility functions, and the City has increased the level of testing being performed on the water.

A nationally recognized vendor (Veolia North America) has been contracted to provide a detailed overview of City procedures and to make recommendations where they see areas of improvements.

The following questions and answers are provided for all interested parties, and are intended to provide transparent, detailed, and updated information that is pertinent to the City of Flint's water system.

City of Flint – Questions and Answers

Is it currently safe to drink City of Flint water?

Yes. Water from the City of Flint meets all of the EPA regulatory standards of the Safe Drinking water Act.

What can you say about the quality?
The City of Flint is committed to providing high quality drinking water to residents and businesses in the community, and has taken every precaution to ensure the water quality meets guidelines for safe drinking water. To ensure that tap water is safe to drink, the Environmental Protection Agency (EPA) prescribes regulations, which limit the amount of certain contaminants in water provided by public water systems. In addition the Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health. The City of Flint tap water meets the guidelines set by both entities.

What is considered to be a contaminant?
Contaminants that may be present in water include microbial contaminants such as viruses and bacteria, and inorganic contaminants such as salts and metals, which can occur naturally. Pesticides, herbicides, organic chemical contaminants and radioactive contaminants could also be present.

It's important to note that **drinking water, including bottled water** may reasonably be expected to contain at least small amounts of some contaminants. But the presence of contaminants does not necessarily indicate that the water poses a health risk.

Will these contaminants make people sick?
The EPA requires that every water report must contain language addressing the fact that some people have comprised immune systems or conditions that make them more vulnerable to contaminants in drinking water than the general population.
A few examples are, an individual with a compromised immune system such as someone undergoing chemotherapy or an organ transplant, a person with HIV/AIDs or other immune system disorders. Some elderly people and infants can be particularly at risk from infections. These individuals and parents of infants should seek advice from their health providers. It's important to understand that this is the case with all public drinking water. It's not unique to water from the Flint River.

How often does the City monitor water quality?
The City monitors its water on a daily basis to assure that water quality remains within established guidelines. With the variances in water temperature, and the leakage and infiltration problems arising due to failure of parts of the distribution system, water quality did exceed, for a time, some of the established guidelines. This resulted in the issuance of the recent notices to the public. Once it was learned that some guidelines were not being met, the City's immediate focus was to bring water quality back within guidelines. The efforts taken to address non-compliance included increasing water flow through valve replacements and hydrant flushing and optimizing treatment processes.

What were the causes of increased levels of bacteria (including fecal) levels that I read about? Have the causes been sufficiently addressed? If not what needs to be done to prevent this from happening again?
As is the case with most systems which treat surface water, many factors contributed to the

environment which allowed bacteria to proliferate. One of the main factors in our case is that when water travels through the 600 miles of the City's distribution mains it will, at times, in certain areas of the city, reside in the system for different periods of time. Water purchased from the Detroit Water & Sewage Department is drawn from Lake Huron, chlorinated, and then it travels over 60 miles to reach the City. By the time the water reaches Flint it is stable and capable of withstanding this type of residency time with the system. Water drawn from the Flint River, specifically in summer months when the temperature is fluctuating, is more susceptible to being impacted by variables such as high residency times and increased chemical reaction. Over the recent three months the residency time of water in the system has been reduced to approximately one week.

The Department of Environmental Quality (DEQ) requires that a minimum of 100 tests be performed monthly for chlorine residuals at various locations throughout the system. When residual levels are too low, it creates an environment in which bacteria such as fecal coliform can grow. After switching sources, we encountered testing sites in June 2014 that were consistently returning low residual levels. Several of these sites became areas that total coliform was eventually detected and ultimately "boil water" notices were issued. A significant cause of this is attributed to aged infrastructure which includes broken valves.

The necessary repairs and adjustments have been made to bring bacteria to acceptable levels with the exception of one test site -- the 2500 block of Flushing Road, where low residual levels continue. The City expects and is actively searching for valve issues. The engineering firm LAN & Potter Consulting is working to develop a hydraulic model of the distribution system and have the ability to use unidirectional flushing that will assist in addressing areas where residual levels are low.

The City has done internal testing recently that shows all eight sites currently well underneath the Maximum Contaminant Level and the next official testing date is due to the DEQ by March 1st, 2015.

It was recently announced in the news that Governor Snyder gave Flint $2 million to fix the water problems? Is this true?
Yes. Under the state's Financially Distressed Cities, Villages and Townships Grant Program, Flint was awarded $2 million to help address some of the problems associated with an aging water distribution system. While the City of Flint is very appreciative of the grant, it's going to take a substantially greater amount to fully address the improvements needed.
The grant will cover two significant projects, one, to decommission the incinerator that will result in ~$400,000 in savings annually to the sewer fund and two, a complete leak detection performed on all of the large transmission mains in the City that will reduce water loss, thereby creating a savings in the water fund.

This issue did not happen before the switch from Detroit water to Flint water. Why now?
Switching to the Flint River has highlighted underground inconsistencies in the distribution system that have existed for decades. Over the last few years, the City has engaged in the development of a more effective and consistent preventative maintenance program and a Capital Improvement Plan that will result in a more reliable water distribution center over time.

Was it known prior to the switch from Detroit water to Flint water that there would be problems managing certain bacteria levels?
It was understood that the Flint River would be subject to variations due to temperature changes, rain events and would have higher organic carbon levels than Lake Huron water and would be more difficulty to treat. These facts were presented to and weighed by licensed staff, LAN engineering consultants and the DEQ. It was determined that Flint has the equipment and the capacity to meet the demands of treating river water.

So in the majority of cases, it's safe to drink Flint tap water?
Yes, as safe it possibly can be. However if a person has a compromised immune system then he/she should consult with her/his physician first. It is also safe to bath and brush your teeth using the water.

What about the "hardness" of the water?
The Flint River is a harder water source than water drawn from Lake Huron. Hardness is classified as having a higher mineral content than "soft water", with the main concentration being calcium and magnesium. Water hardness is not considered by the EPA to be a health hazard.
Water hardness has been known to impact things such as cleaning tasks such as laundry, dishwashing, bathing personal grooming, and has also been associated with some forms of skin irritation such as eczema.

What are the public reporting requirements for these sorts of problems, and has the City met those requirements? What can be done to communicate useful information about a public health threat in timelier manner?

The EPA 2010 "Revised Public Notification Handbook" has a specific breakdown of the elements required in public notifications and includes usable templates. The EPA has three different tiers associated with community water systems (CWS), each with specific timeframes and requirements that trigger upon issuance of the violation.

- **Tier 1.** CWS must provide **public notification within 24 hours of a violation** and continue this as directed by the primary agency.
- **Tier 2.** CWS must provide **public notification within 30 days of a violation** and continue this every three months until the violation is resolved
- **Tier 3.** CWS must provide **public notification within one year** and the EPA recommends repeat occurrences be provided in an annual notice

The current violation is classified as a tier 2 violation and was issued December 16, 2014.

Besides the home notifications, where can I find official communications and any updates on the Flint water issue?
The City posts information on the City of Flint website at www.cityofflint.com. There is a special section dedicated to addressing Flint water concerns and providing up-to-the-minute updates. In

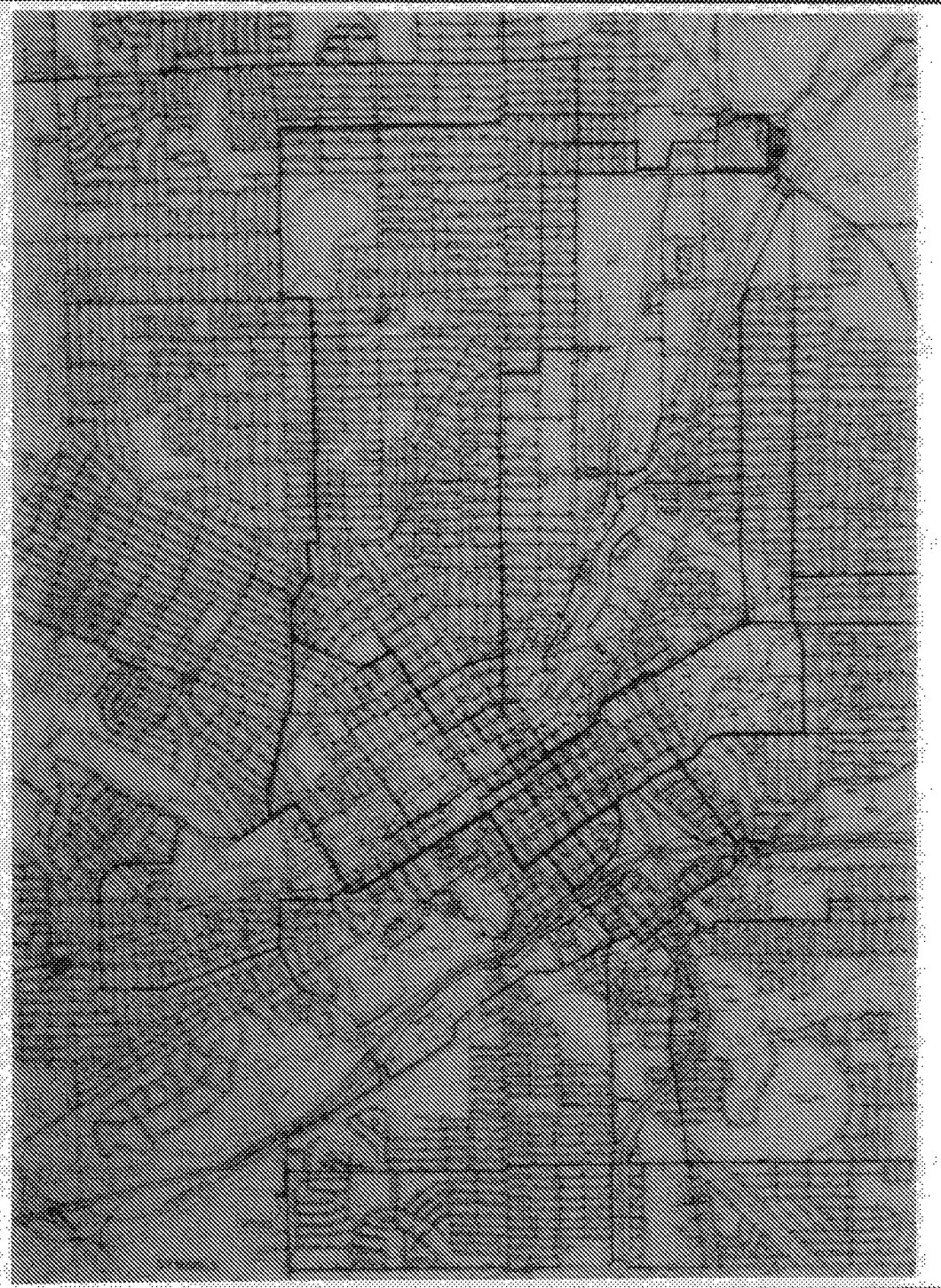
addition, updates can be found on Flint's Facebook page and citizens may also call the Flint Water Plant & Facilities at 810-787-6537 with questions.

If the water is ok to drink, why did GM stop using the water?

General Motors has been A great partner to the city for many years and when they recognized that an elevated level of chloride in the water was having an impact on a specific machining process they requested permission to transfer water delivery for that specific process to Flint Township. This represents only 10% of the water purchased and used by GM at the entire site. The remaining 90% of their water usage including all of the drinking water for GM employees is still purchased from the City of Flint.

Respectfully Submitted,

Howard D. Croft
Public Works Director



City of Flint
Water System Facts

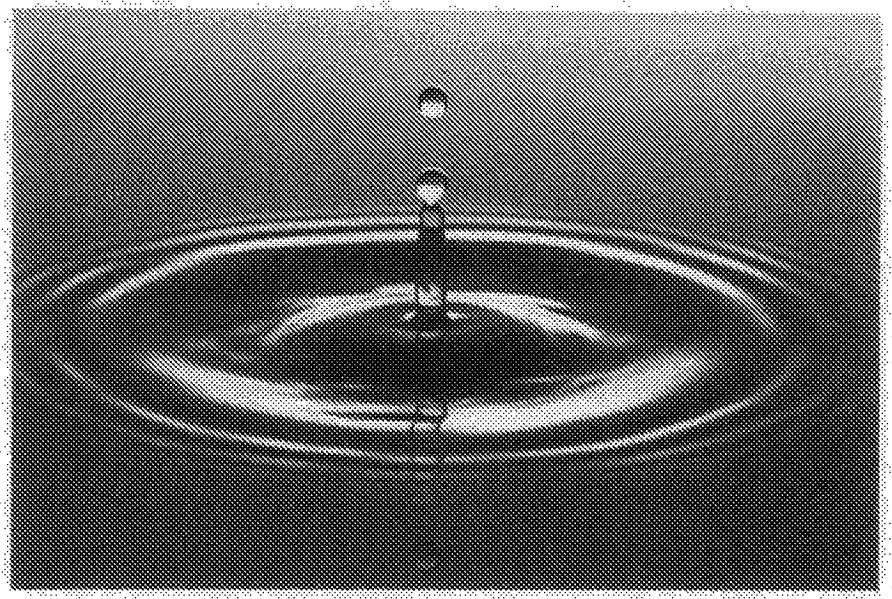
Over 600 Miles of Distribution Mains

Over 7000 Valves
Over 3909 Hydrants

Over 46,000 users in 2006
Only 31,000 users in 2014

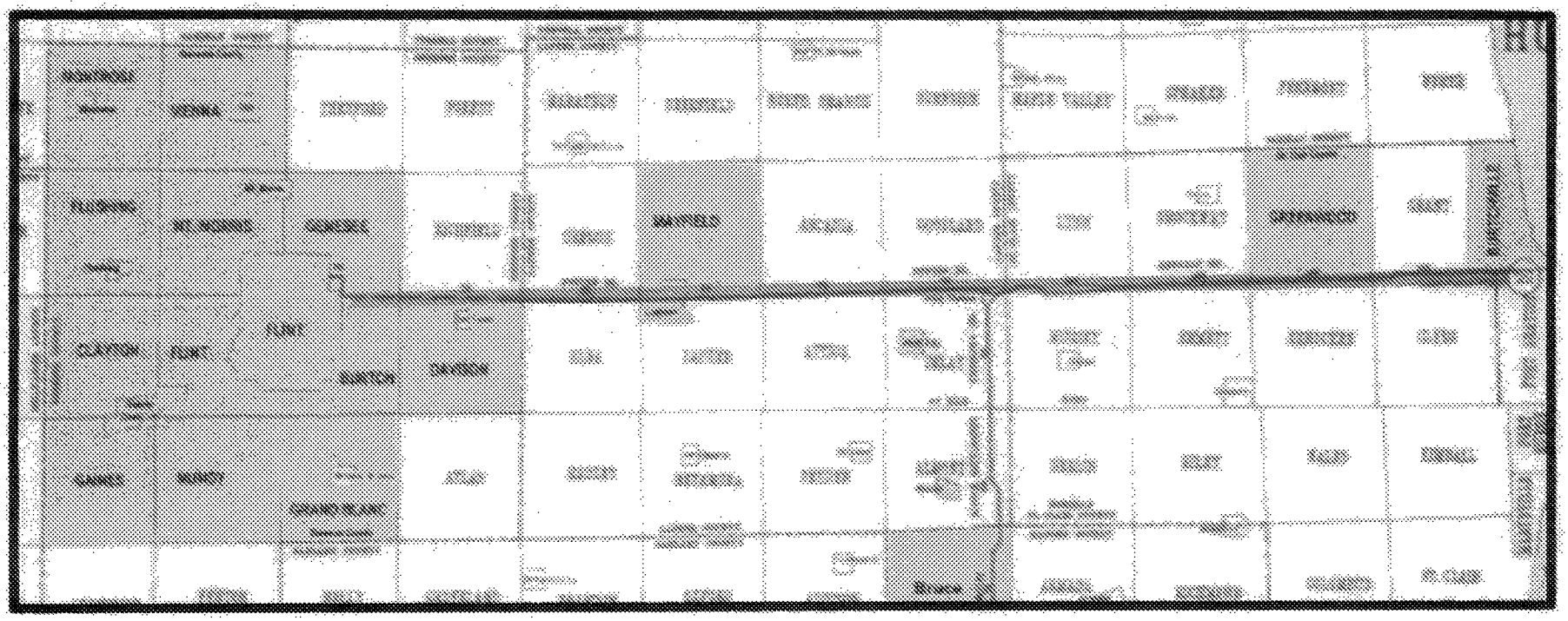
What Can Impact Water Quality ?

- Condition of source water
- Temperature
- Organic material
- Retention time in system
- Low flow
- Dead ends
- Main Breaks
- Repairs



Quality Indicators

- Chlorine residual
- Total coliforms



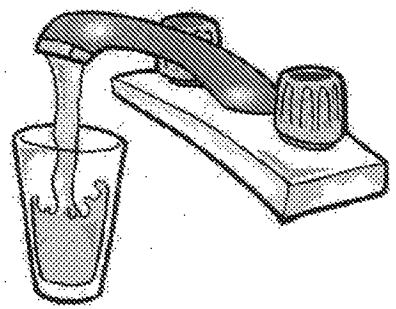
Flint River

vs.

DWSD

CITY TESTING

- 10 test sites around the city
- Tests are performed manually 2 – 3 times a week
- Over 100 Tests are performed a month
- All tests are reported to the DEQ for oversight
- Tests are performed EVERY four hours inside the Plant
- The City responds to and tests all reported concerns



Michigan DEQ
State License Types

Complete Treatment	Limited Treatment	Distribution
F-1	D-1	S-1
F-2	D-2	S-2
F-3	D-3	S-3
F-4	D-4	S-4

Recent Boil Water Advisories in MICHIGAN

LOCATION	DATE	CAUSE
Edwardsburg / Lunker	Nov 12, 2014	Fire
Superior Township	May 03, 2014	Main Break
Benton Harbor	Jan 9, 2014	Water Pressure
Union Township	Nov 6, 2013	Main Break
Charlevoix	August 7, 2013	Pressure Loss
Novi	Feb 13, 2013	Pressure Loss
Muskegon Heights	Nov 17, 2012	Main Break
Commerce Township	Dec 6, 2010	Depressurization

City of Flint Contacts

Public Works Director	Howard Croft – hcroft@cityofflint.com
Utilities Administrator	Daugherty Johnson- djohnson@cityofflint.com
Plant Supervisor	Brent Wright – bwright@cityofflint.com
F-1 Operator in Charge	Mike Glasgow – mglasgow@cityofflint.com
S-1 Operator in Charge	Robert Bincsik – rbincsik@cityofflint.com

Phone Numbers

City of Flint Treatment Plant	810-787-6537
Public Works Director	810-766-7346 x 2403
Utilities Administrator	810-766-7135 x 2602
EPA Safe Drinking Water Hotline	1-800-426-4791

City of Flint / Veolia Technical Advisory Committee

	COMPANY	NAME	TITLE	PHONE	DESIGNEE	CONTACT INFO	
1	General Motors	Randy Tanner	Head of Engineering	810-577-8552			Yes
2	MSU - Lansing	Dr. Joan Rose	Chair in Water Research	517-432-4412	**Dr. Joan Rose**	rosejo@msu.edu	Yes
3	Greater Flint Health Coalition	Kirk Smith	President	810-232-2228	**Kirk Smith**	ksmith@flint.org	Yes
4	County Drain Commissioner	Jeff Wright	Deputy Drain Commissioner	810-732-7870	**John O'Brien**	jfobrien@gcdcwws.com	Yes
5	U of M Flint	Michael Lane	Dir. Environmental Health & Safety	810-766-6763	**Michael Lane**	mjlane@umflint.edu	Yes
6	Mott Community	Larry Kohler	Executive Director		**Larry Koehler**	larry.koehler@mcc.edu	Yes
7	Genesys Pace Hospital	Donna Cole	Property Manager	810-606-5611	**Donna Cole**	donna.cole@genesys.org	Yes
8	Hurley Hospital	Melanie Gavulic	President / CEO		**Norb Birchmier**	mgavuli1@hurleymc.com	Yes
9	McLaren Hospital	Don Kooy	President / CEO		**Russell Hudson**	don.kooy@mclaren.org	Yes
10	Genesee County Medical Society	Pete Levine	Executive Director	810-733-9925	**Gerald Natzke**	plevine@gcms.org	Yes
11	Dept. of Environemental Quality	Mike Prysby	District Supervisor	517-290-8817	**Mike Prysby**	prysbym@michigan.gov	Yes
12	Genesee Health Department	Jim Henry			**Jim Henry**	jhenry@gchd.com	Yes
	City of Flint	Howard Croft	DPW Director	810-577-1202	**Howard Croft**	hcroft@cityofflint.com	Yes
	City of Flint	Daugherty Johnson	Utilities Administrator	810-577-8906	**Duffy Johnson**	djohnson@cityofflint.com	Yes
	City of Flint	Brent Wright	Plant Supervisor	810-787-6537	**Brent Wright**	bwright@cityofflint.com	Yes
	City of Flint	Mike Glasgow	Asstant Plant Supervisor		**Mike Glasgow**	mglasgow@cityofflint.com	Yes

City of Flint
Water Improvements since November 2014

DATE	IMPROVEMENT	EFFECT
Nov.	Increased flushing efforts (as weather permits)	Reduced time of water in the system
Nov.	Adjusted operational softening to no less than 80%	Reduce chlorine demand
Dec.	Started hydraulic modeling of distribution system	Helps to identify locations of bad valves
Dec.	Started evaluation of different polymers	Removal of organic carbon
Dec.	Started SCADA upgrades inside of Water Plant	Improvement of internal software controls
Jan.	Hired vendor to upgrade efficiency of the ozone system	Better oxidation and disinfecting
Jan.	Started jar testing	Assists in dosage amounts and polymer aids
Feb.	Hired consultant Veolia for process review	Professional recommendations
Feb.	Leased and installed TTHM analyzer	Increased internal testing ability
Feb.	Adjustments to reservoir level to match demand	Reduce time of water in system

City of Flint
Water Timeline

Legend

△ TTHM Quarterly Testing

● Specific Dates of Events

October 3rd - City receives engineered estimates on the ability to upgrade the Flint Water Plant along with costs estimates.

Summer- City of Flint experiences multiple boil water advisory notices, complaints about smell, taste, and discoloration of water.

January 2nd - City releases violation letter to the public via U.S. mail.

February 27th - City receives results from the state lab showing that Feb. quarterly results are all well below the MCL

March 4th & 5th - City of Flint holds first two advisory committee meetings..

Nov Test
(1 of 8) > MCL

2013 2014 2015 2016 2017

May Test
(6 of 8) > MCL

Aug Test
(8 of 8) > MCL

Feb Test
(0 of 8) > MCL

April 18th - City of Flint signs agreement with KWA.

DWSD terminates existing contract ~24 hours later.

April 30th - City of Flint officially closes all valves to complete the separation from DWSD water source.

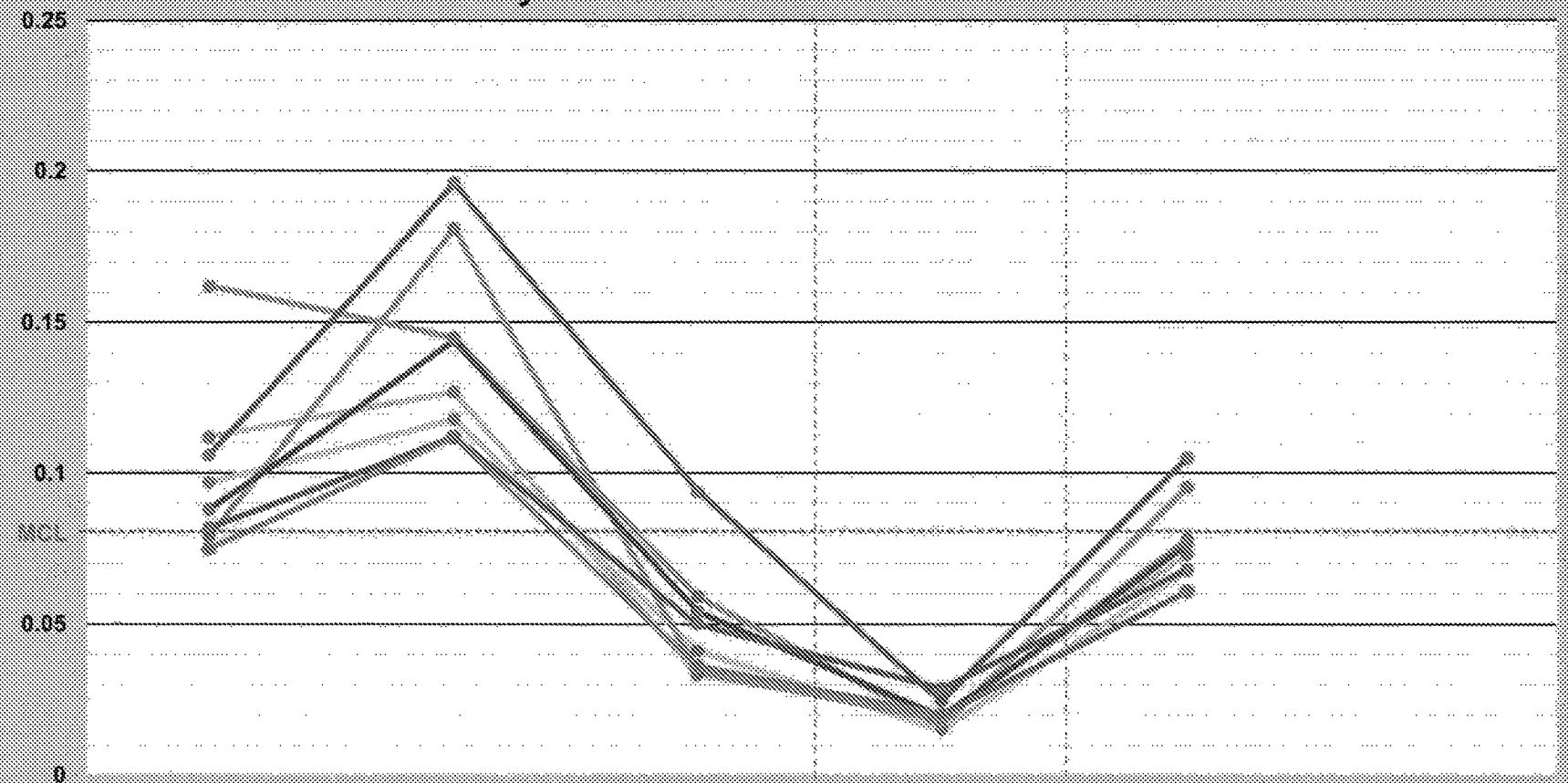
November 7th - City of Flint staff and engineering team meet with DEQ to discuss Quarterly TTHM results and begin drafting OER

December 18th - City receives official violation notice from DEQ

February - City of Flint signs contract with Veolia for additional review and recommendations.

Summer - **KWA raw water expected to reach Flint Treatment Plant.**

City of Flint TTHM Chart



	21-May-14	21-Aug-14	20-Nov-14	15-Feb-15	Total
Series 1	0.162	0.145	0.059	0.016	0.0955
Series 2	0.112	0.127	0.033	0.0199	0.072975
Series 3	0.097	0.118	0.041	0.0149	0.067725
Series 4	0.106	0.196	0.094	0.0245	0.105125
Series 5	0.079	0.181	0.034	0.0181	0.078025
Series 6	0.088	0.144	0.054	0.0192	0.0763
Series 7	0.082	0.112	0.05	0.0285	0.068125
Series 8	0.075	0.112	0.036	0.0199	0.060725
	Quarterly Result	Quarterly Result	Quarterly Result	**Current Quarterly Result**	4 Quarter Average

Flint Water
Technical Advisory Committee
May 20, 2015
Flint City Hall

Agenda

2:00 pm	**Welcome** **Purpose of the Technical Advisory Committee: Provide a respectful means of sharing factual information and having dialogue around the City of Flint water.**
2:05 pm	**Introductions**
2:10pm	**Current water status information – M. Glasgow, Operator In Charge (F-1)**
2:20 pm	**Improvements information – H. Croft, Director Department of Public Works** New filter media installation Leak detection New pipe installation Water meter installation New water page on City website ⟶ Live by next June - More web page for residents
2:40 pm	**Discussion on next TTHM testing expectations** ⟶ ⟶ TTHM → the water
2:50pm	**Discussion on current health concerns, including lead and copper testing**
3:30pm	**Next Steps** Next meeting, one month or two months?
3:35 pm	**Adjourn**

Sources of Information:

City Website: CityofFlint.com See Residents: WATER or
Departments: Public Works: Utilities - many links to reports, Q&A and other useful information.

If you, or another Flint resident, would like to have their water tested: call 810-766-7135 ext 2606

DISINFECTION BY-PRODUCTS - DEQ Required Testing

MCL for TTHM = 80 ug/L MCL for HAA5 = 60 ug/L

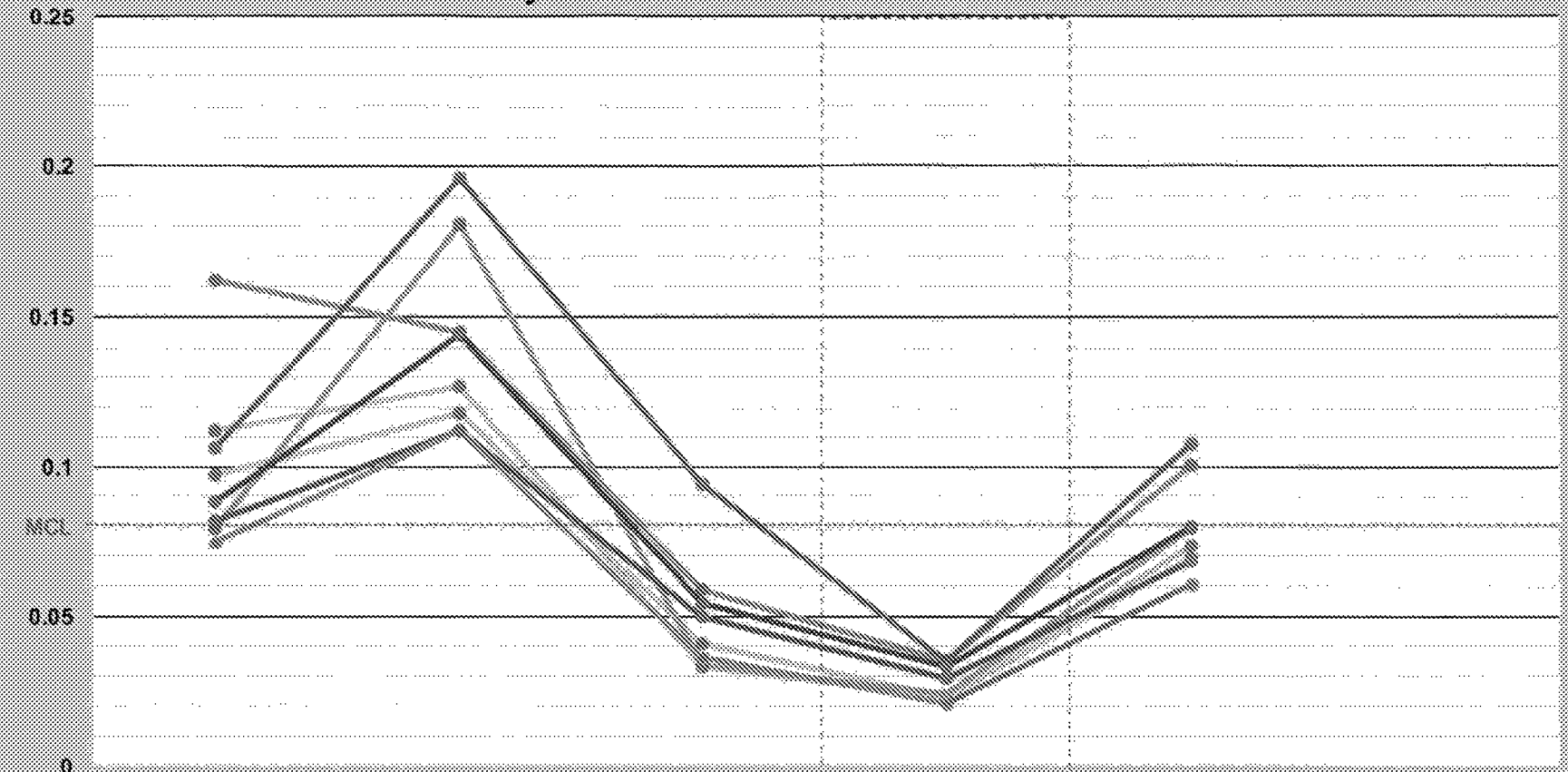
	May-14		Aug-14		Nov-14		Feb-15		LRAA		MAX	MIN
	TTHM	HAA5	TTHM	HAA5	TTHM	HAA5	TTHM	HAA5	TTHM	HAA5	TTHM	TTHM
Water Plant Tap	56	38	86	36	33	26		36	58.3	36.0	86.0	33.0
	*Once Yearly (June 2014)		*Once Yearly (June 2014)		*Once Yearly (June 2014)		*Once Yearly (June 2014)		*Once Yearly (June 2014)			
Site # 1	162.4	64.0	145.3	43.0	58.6	16.0	16.2	9.0	95.6	33.0	162.4	16.2
Site # 2	111.6	52.0	112.0	40.0	36.2	21.0	19.9	9.0	69.9	30.5	112.0	19.9
Site # 3	96.5	48.0	127.2	31.0	33.3	15.0	16.8	9.0	68.5	25.8	127.2	16.8
Site # 4	106.4	55.0	181.3	24.0	33.9	15.0	18.1	9.0	84.9	25.8	181.3	18.1
Site # 5	79.1	38.0	196.2	11.0	93.6	24.0	24.5	9.0	97.4	20.5	196.2	24.5
Site # 6	82.2	41.0	112.4	25.0	50.1	5.0	28.5	2.0	68.3	18.3	112.4	28.5
Site # 7	88.2	49.0	144.4	30.0	53.6	17.0	19.2	9.0	76.4	26.3	144.4	19.2
Site # 8	79.2	50.0	118.3	37.0	41.1	18.0	14.9	9.0	63.4	28.5	118.3	14.9

*Sampled at end of Oct.

Total Organic Carbon (mg

	Raw	Final
May	10.30	4.57
June	9.00	3.63
July	6.44	2.67
August	8.48	4.06
Sept.	7.36	3.30
Oct	7.38	2.99
Nov	7.27	3.86
Dec	6.49	2.59
Jan	7.62	3.21
Feb	5.95	2.07

City of Flint TTHM Chart

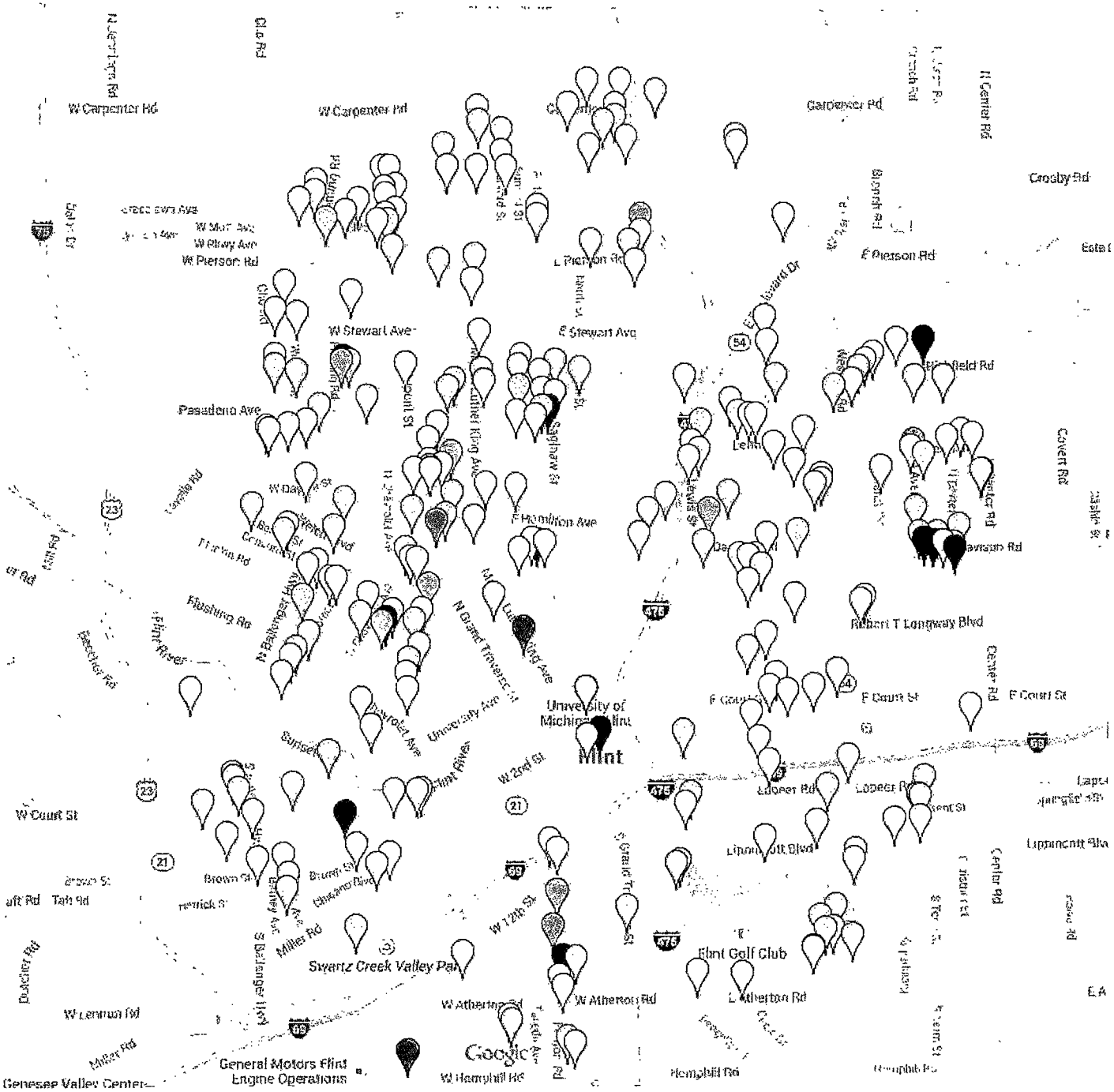


	20-May-14	20-Aug-14	21-Nov-14	21-Feb-15	Total
Series 1	0.162	0.145	0.059	0.035	0.10025
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Series 3	0.097	0.119	0.041	0.023	0.06975
Series 4	0.106	0.196	0.094	0.035	0.10775
Series 5	0.079	0.181	0.034	0.024	0.0795
Series 6	0.088	0.144	0.054	0.033	0.07975
Series 7	0.082	0.112	0.05	0.029	0.06825
Series 8	0.075	0.112	0.036	0.021	0.061
	Quarterly Result	Quarterly Result	Quarterly Result	**Current Quarterly Result**	4 Quarter Average

Water Main Breaks 2014

Main Breaks from Leak Report

- Clean break
- Split at pipe bell
- 2" dia hole
- Service line
- Corp break
- Pipe bell clean break
- hole in mechanical bell
- mechanical joint
- 3" dia hole
- 4" hole
- Previous repair failure
- Split pipe
- Split tee
- valve face
- 1" dia hole
- 2" split
- 3" split
- 3/4" lead corp
- 4" split
- Tapping saddle
- Other / No data



City of Flint

Water Forum

5/30/2012

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City Of Flint Water History Facts

Current Treatment Plant was put into service in 1954.

Current 72" main pipeline was completed in 1970.

Flint signed a 30 year contract with Detroit water and Sewer Department in the mid 1960's.

The contract with DWSD has expired and we are currently operating on a yearly extension.

In 2006 Flint completed a $48,000,000 upgrade of the existing Water Plant. (Required by the MDEQ & for backup only).

Flint's Water & Sewer System is approximately a 300,000,000 Enterprise.

Flint's Water & Sewer System is designed to deliver water to over 200,000 people with over 1,500 miles of infrastructure.

Flint's most recent census count shows a population of approximately 102,000 in 2010.

Flint's census population in 2000 was approximately 124,000.

The water system had over 45,000 customers in June of 1999.

The water system had just over 36,000 customers by June 2011.

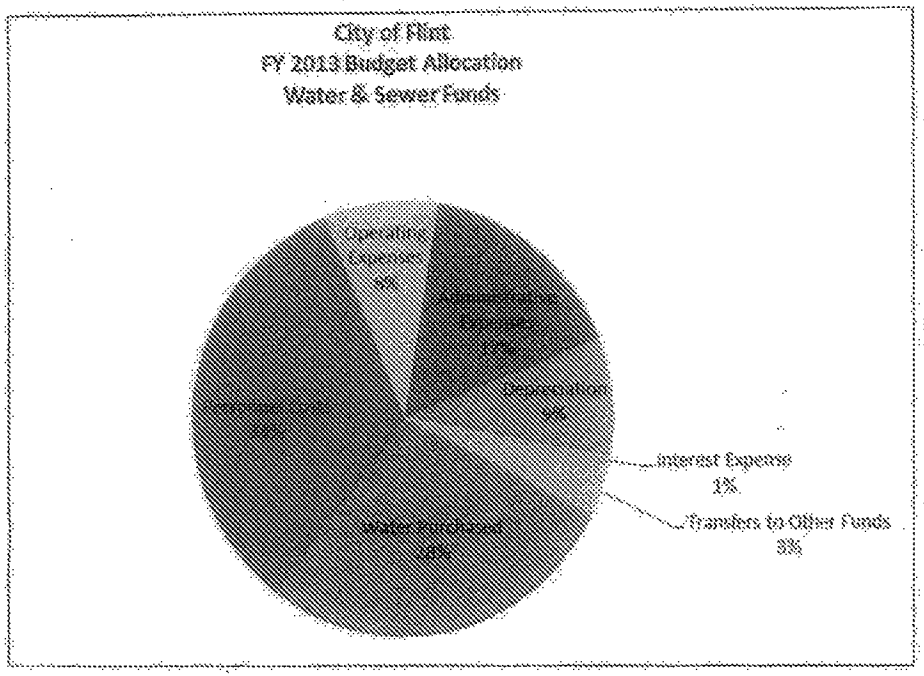
The "Fixed Costs" that must be covered to maintain the system and deliver quality water have increased over time.

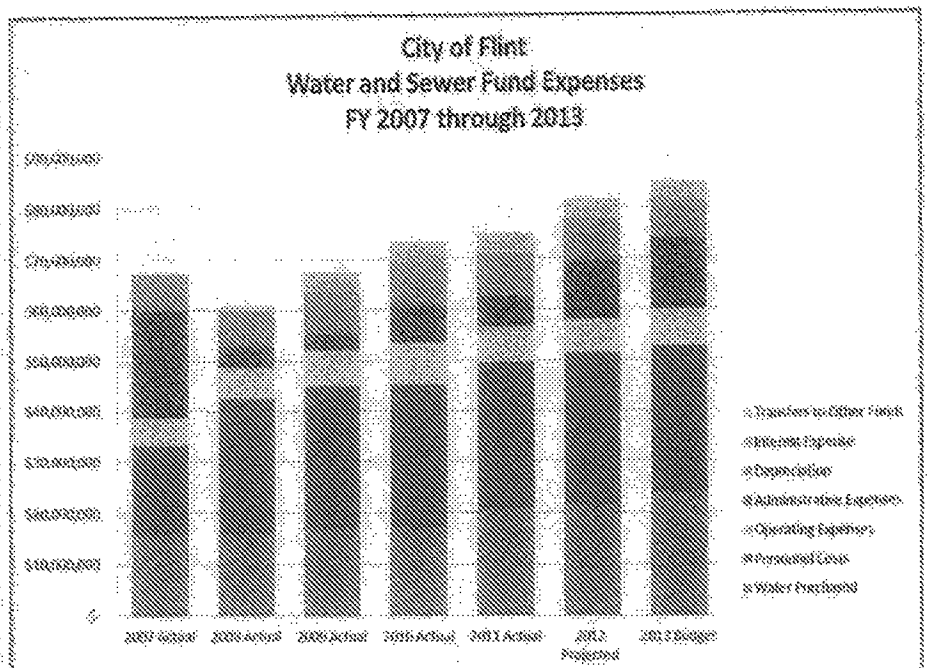
City Of Flint
Most Frequently Asked Questions about Water

- ❑Why are the water rates so high ?
- ❑How does my water bill work (Explanation of charges) ?
- ❑Why do others in the area pay less for the same amount of water ?
- ❑Where has all of the water and sewer fund money gone ?
- ❑What do I do if I think my bill is incorrect ?
- ❑What effect does leakage or theft have on my bill ?
- ❑How can I report water theft ?
- ❑Why don't we go back to using the Flint River like we once did ?

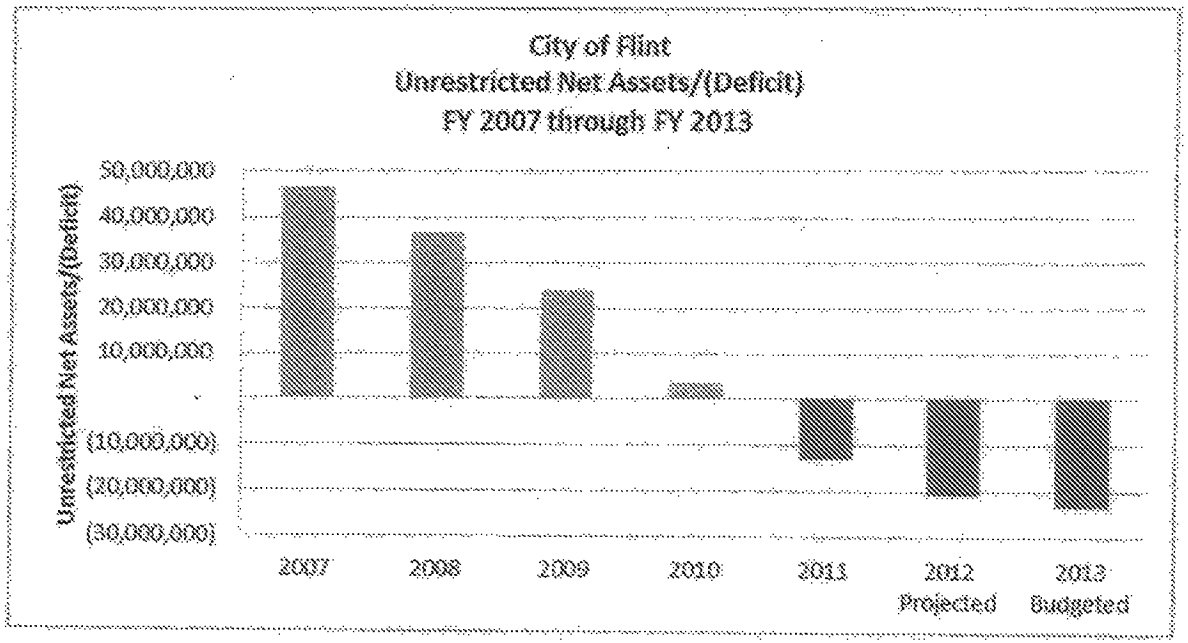
City of Flint

Budget Allocation and Fund Expenses

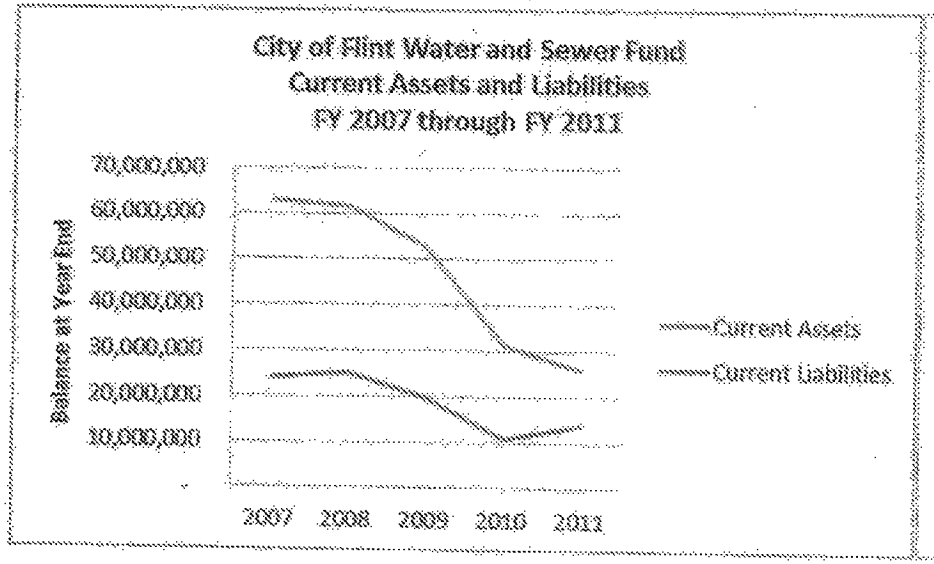


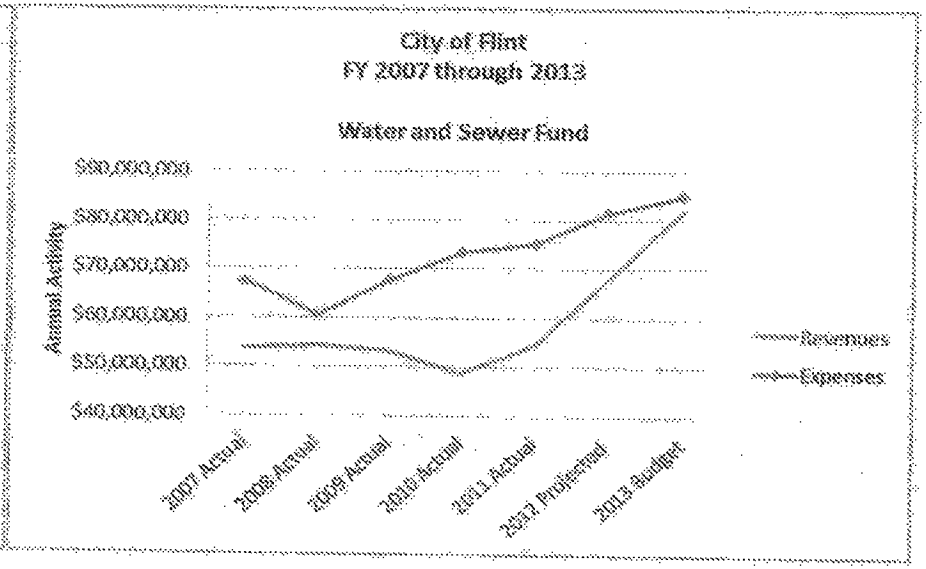


	Audited						
	2007 Actual	2008 Actual	2009 Actual	2010 Actual	2011 Actual	2012 Projected	2013 Budget
Operating Revenues	51,090,679	51,100,332	51,906,553	47,926,589	54,385,644	67,983,044	81,734,552
Other Revenues	2,627,939	3,274,450	1,442,383	764,886	68,645	126,670	455,867
Annual Revenues	53,718,618	54,374,782	53,348,936	48,691,475	54,454,289	68,109,714	82,190,419
Water Purchased	16,052,006	16,297,871	17,421,663	17,103,752	20,919,987	21,756,787	24,031,417
Personnel Costs	17,292,444	26,302,590	27,591,206	28,149,946	28,618,817	29,640,499	28,546,350
Operating Expenses	5,355,638	6,145,119	6,950,534	8,146,390	6,917,964	6,420,260	7,259,290
Administrative Expenses	21,300,900	4,229,382	3,403,231	7,327,630	6,221,627	11,465,462	14,140,047
Depreciation	7,217,142	7,132,870	8,364,022	8,854,889	8,689,809	8,615,000	7,500,000
Interest Expense	86,632	485,499	868,031	812,270	754,890	705,150	644,314
Transfers to Other Funds	-	-	2,990,000	2,990,000	2,990,000	2,990,000	2,990,000
Annual Expenses	67,304,762	60,593,331	67,588,687	73,384,877	75,113,094	81,593,158	85,111,418



	2007 Actual	2008 Actual	2009 Actual	2010 Actual	2011 Actual	2012 Projected	2013 Budget
Revenues	53,718,618	54,374,782	53,348,936	48,691,475	54,454,289	68,109,714	82,190,419
Expenses	67,304,762	60,593,331	67,588,687	73,384,877	75,113,094	81,593,158	85,111,418

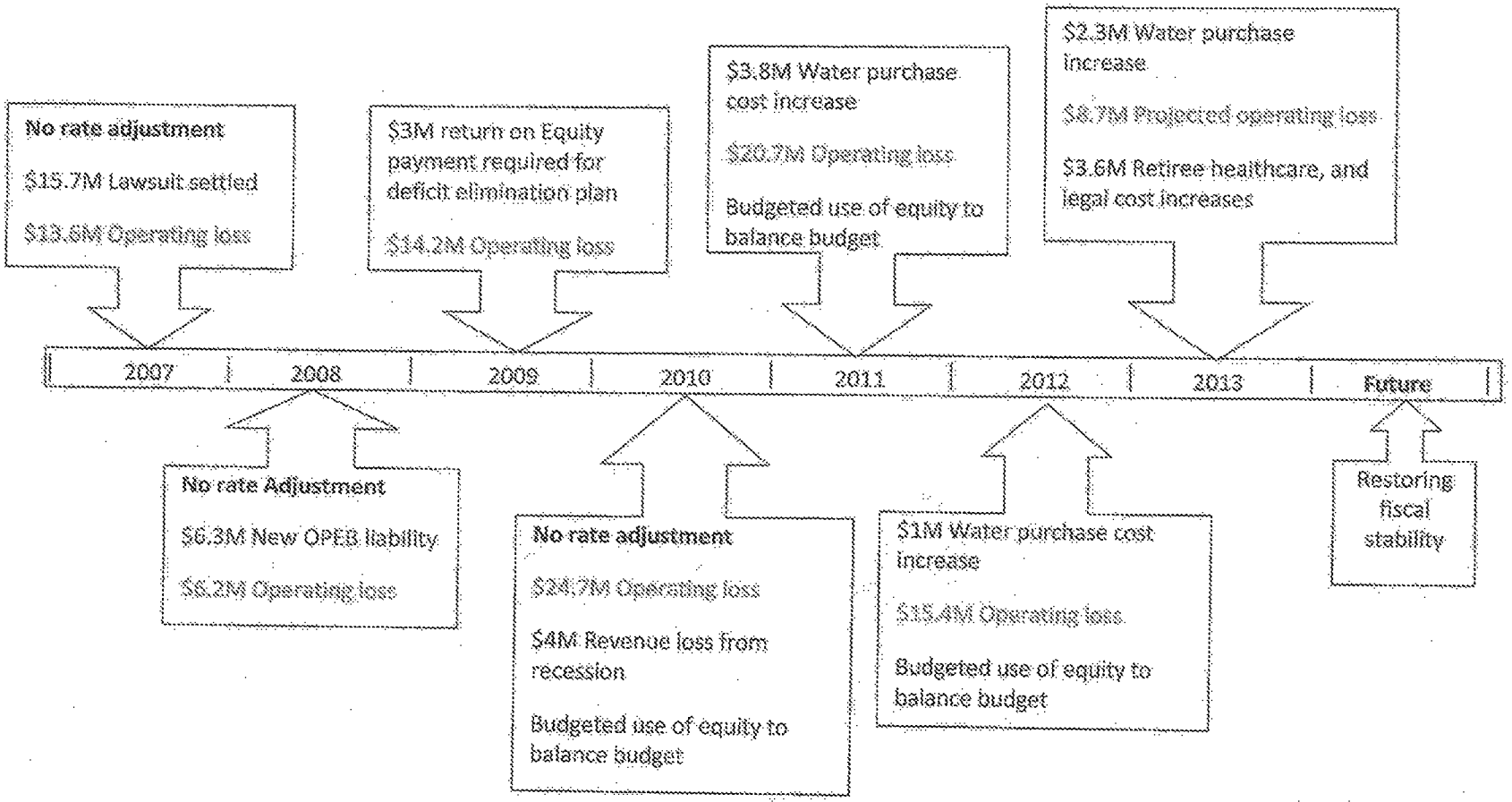




City of Flint

Recent Timeline of Water and Sewer Funds

FY 2007 through 2013



City of Flint- Water and Sewer System Additional Asset / Revenue Data

The average annual residential water sewer bill in FY2005 was less than $700 annually
The average annual residential water/ sewer bill in FY13 will be nearly $1,700

Expenses have exceeded revenues every year since 2006:

FISCAL YEAR	Rate Base	Revenues	Expenses	Revenues Minus Expenses	Unreserved System Equity
2006	2005	$55,204,242	$50,933,792	$4,270,450	$60,340,013
2007	2006	$53,656,857	$67,442,993	($13,586,136)	$46,399,452
2008	2006	$54,374,781	$60,593,331	($6,218,550)	$36,462,468
2009	2009	$63,486,463	$87,726,219	($14,239,756)	$24,023,095
2010	2009	$48,920,329	$73,513,725	($24,593,396)	$3,581,766
2011	2011 2011	$54,827,079	$75,185,879	($20,858,800)	($12,856,807)
2012		$68,279,187	$83,682,846	($15,403,660)	($28,584,122)
2013	2013	$62,220,420	$90,970,420	($8,750,000)	($23,379,698)
				($96,270,540)	

FACTORS IMPACTING SOLVENCY			COST IMPACT
			(millions)
No rate adjustment			??
$15.7 million lawsuit settlement	15.7	0	$15.7
No rate adjustment			??
OPEB liabilities added	3.6	2.7	$6.3
ROE payment added as part of City t	1.9	1.1	$3.0
No rate adjustment			??
Use of retained earnings budgeted	12.5	0.5	$13.0
Revenue lost due to recession	2	2	$4.0
Use of retained earnings budgeted	7.1	3.5	$10.6
Water purchase cost increase	0	5.8	$5.8
Use of retained earnings budgeted	5.1	0	$5.1
Water purchase cost increase	0	0.8	$0.8
Water purchase cost increase	0	2.3	$2.3
RHC/Legal/Admin Cost Allocation	2.1	1.5	$3.6
			$68.2

Calculation of Water and Sewer Rates for FY13 Budget

March, 2012:

	Expense Projection Based on FY12 Costs	Revenue Projection Based on FY12 Receipts	Difference Between Projected Revenues and Expenses	Rate Increase Necessary To Close Gap
Water	$49.9	$44.4	-$5.5	12.4%
Sewer	$31.0	$21.4	-$9.6	44.9%
TOTAL	$80.9	$65.8	-$15.1	22.9%

CITY of FLINT, MICHIGAN
WATER &/OR SEWER BILL

Service at: 5810 BALDWIN BLVD

TREASURER
CITY OF FLINT
P.O. BOX 1950
FLINT, MI 48501

PRESORTED
FIRST CLASS MAIL
US POSTAGE PAID
CITY OF FLINT

3419 Active

ACCOUNT NUMBER	DUE DATE
[redacted]	02/28/2012
	NET AMOUNT DUE
	147.85

RETURN THIS STUB WITH YOUR PAYMENT

Seq=3138

**AUTO [redacted]

00000376810000014785022820120000014913777O6

KEEP THIS PORTION FOR YOUR RECORDS

LAST READ/DATE/TYPE		NEW READ/DATE/TYPE		CONS	SERVICE	CHARGE
361	01/05/2012 A	363	02/03/2012 A	2	Sewer Non-metered	6.62
					Sewer Svc Chg	22.07
					Water	13.36
					Water Svc Chg	19.36

Prev. Balance	161.08
Payments	-75.00
Adjustments	0.00
Current Penalty	0.36
New Charges	61.41
Total Due	147.85
Due Date	02/28/2012

ACCOUNT: BALD-005810-0000-01 SERVICE AT [redacted]

PENALTY ASSESSED 30 DAYS AFTER DUE DATE

CITY OF FLINT
DEPARTMENT OF FINANCE

Customer Service Center

Dayne Walling
Mayor

Douglas Bingaman
Treasurer

CITY OF FLINT
WATER NON-PAYMENT TURN-OFF POLICY

1. Water services to any customer may be shut off if the account is not paid until after 30 days after the due date. (City ordinance 46-52 (h))

2. Non-payment turn-offs are done only Monday through Thursday. The Customer Service Center does not schedule non-payment turn-offs on Fridays, Saturdays, Sundays, or most recognized holidays.

3. Illegal usage, broken payment arrangements and NSF (non-sufficient funds) turn-offs are done at any time without additional notice.

4. Turn-off notices are mailed to delinquent customers fifteen (15) days before actual turn-off.

5. The water customer is responsible for maintenance of all plumbing in the premises including connection to City water mains or sewer lines.

6. If a customer disputes a water bill and is unable to resolve the issue with Customer Service personnel, the customer may request an administrative review. Further information on any water account may be obtained by calling (810) 766-7015 or visiting the Customer Service Center at 1st Floor, City Hall, 1101 S. Saginaw St.

Preliminary Options for Future City of Flint Water Sources

Consider a New Negotiated Contract with Detroit Water and Sewer Department

PROS	CONS
No upfront capital costs	Lack of control over new / fixed changes
Possibility to negotiate a lower rate	Past practices
Ability to "Blend" water sources to further control costs	

Consider a Contract with the Karegnondi Water Authority

PROS	CONS
Voting member of KWA board	Capital cost (debt service)
Ability to "Blend" water sources to further control costs	Uncertainty of final costs
Raw water is an asset for attracting new buisnesses	

Blended Use of the Flint River

PROS	CONS
Helps contro cost of water	

*** CURRENTLY NO DECISIONS HAVE BEEN MADE REGARDING THE FUTURE WATER SOURCE

Improvements for City of Flint Water System

Reduce Leakage

- **Finalize a Preventative Maintenance Plan**
  - (Planning started in January 2012, requires funding, … part of Operational Costs)
  - Will help identify repair area's

- **Reduce water theft**

- **Replace water meters**
  - We currently have an eighteen month plan to replace all meters with more efficient "*Smart Meters*"

- **Encourage routine household checks**
  - "Faulty" toilets are a significant reason for household water loss. and unexpected larger bills.

Other Leakage concerns

✓Transmission Loss

✓Fire Hydrants

✓Incorrect water bills

✓Non-Payment

City of Flint
Water Improvements since November 2014

DATE	IMPROVEMENT	EFFECT
Nov.	Increased flushing efforts (as weather permits)	Reduced time of water in the system
Nov.	Adjusted operational softening to no less than 80%	Reduce chlorine demand
Dec.	Started hydraulic modeling of distribution system	Helps to identify locations of bad valves
Dec.	Started evaluation of different polymers	Removal of organic carbon
Dec.	Started SCADA upgrades inside of Water Plant	Improvement of internal software controls
Jan.	Hired vendor to upgrade efficiency of the ozone system	Better oxidation and disinfecting
Jan.	Started jar testing	Assists in dosage amounts and polymer aids
Feb.	Hired consultant Veolia for process review	Professional recommendations
Feb.	Leased and installed TTHM analyzer	Increased internal testing ability
Feb.	Adjustments to reservoir level to match demand	Reduce time of water in system

Flint Water Advisory Committee First Meeting
March 5, 2015 2-4pm MTA Auditorium

Agenda

Committee Members will receive a packet at the entry with their name tag, question sticky notes, pencil and other sources of information.

I. **Welcome and Introduction of Facilitators**

II. **Facilitator Ground Rules and Agenda Review**

Purpose of the Water Advisory Committee: Provide a respectful means of sharing factual information between the City of Flint and the Flint Water and Sewer Customers

The meeting will follow the printed agenda.

The meeting must conclude at 4pm today. The Facilitator will keep us on track.

III. **Expected Outcomes:**

Today's meeting: that all of the water questions have been identified – we may not be able to answer all today, but we would like to set up a means of communicating with this committee on a regular basis.

Through 2016 – That the transition to KWA water processing and distribution is a smooth, satisfactory process resulting a safe, consistent water supply.

IV. **Status of Water and Distribution System Today – H. Croft, Director Department of Public Works**

Evaluation of Flint Water Treatment Plant and Distribution System – Veolia, City of Flint Consultant

V. **Questions from Committee Members and Sort by Category: Safety, Quality, Affordability, Sustainability, History, and Miscellaneous**

VI. **Response to most frequently asked questions.**

VII. **Next Steps**

The next meeting has been scheduled for Thursday, March 19, 2015 here at the MTA Auditorium from 2-4pm.

How often would the committee like to meet? How did this format work?

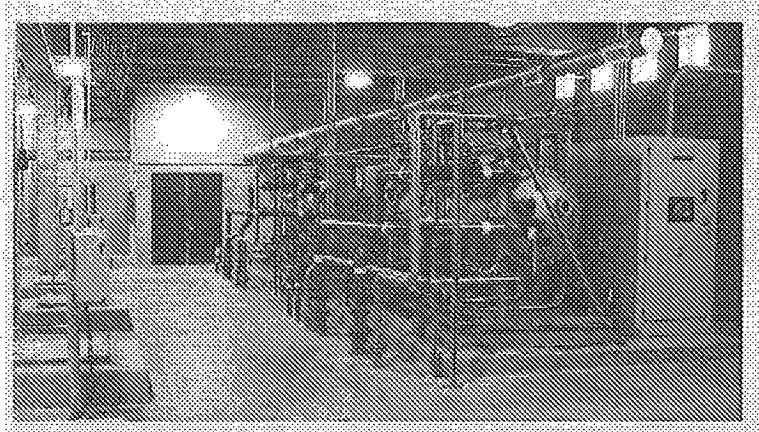
VIII. **Adjourn**

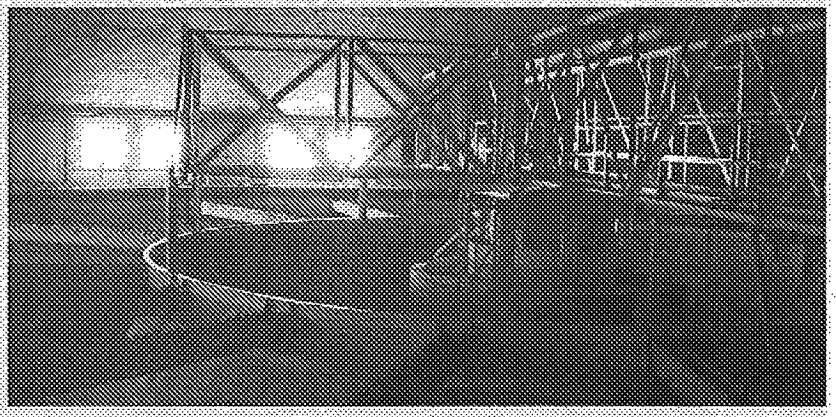
Operational Evaluation Report
City of Flint

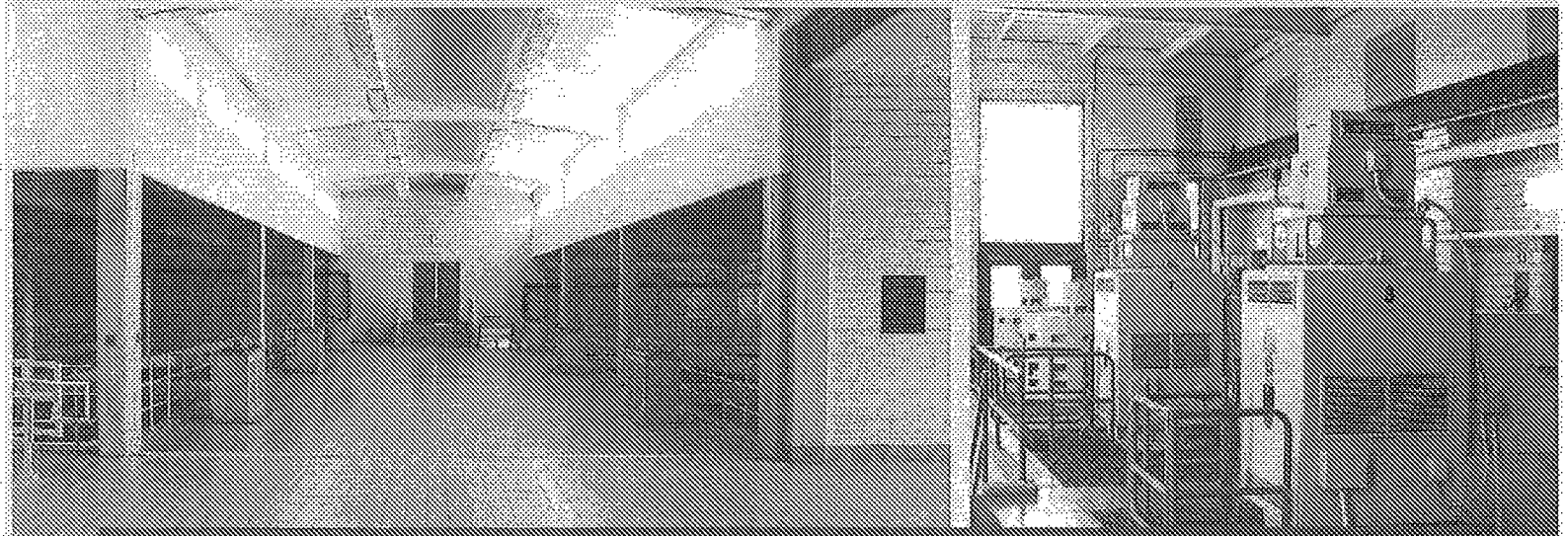
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Trihalomethane Formation Concern

November 2014







Lockwood, Andrews & Newnam, Inc.
A LAN A BWA COMPANY

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EXECUTIVE SUMMARY

Environmental Protection Agency (EPA) and Michigan Department of Environmental Quality (MDEQ) regulations require that public water suppliers test drinking water quarterly throughout the distribution system for disinfectant by-products (DBP's). Two categories of DBP's, tri-halomethanes (THM) and halo-acetic acids (HAA5), are regulated and must be tested for. The City of Flint began operation of their water treatment plant (WTP) full time with the Flint River as the source on April 25, 2014. Since that time, two quarters of samples taken indicate that future violations are inevitable for total THM without some modifications to the water system. In response, the City hired Lockwood, Andrews & Newnam, Inc. (LAN) to complete this Operational Evaluation Report (OER) in conformance with EPA guidelines with the goal to determine the cause(s) of high levels of THM and evaluate possible solutions.

The EPA promulgated the Stage 2 Disinfectants and Disinfection By-Products Rule (DBPR) in January 2006 which set maximum contaminant levels (MCLs) for total trihalomethanes (TTHM) and HAA5 based on an annual running average, tested quarterly, for a given sampling location. The City of Flint reports levels from 8 sampling test locations. Of the two quarterly sampling cycles since Flint began operating the WTP full time, HAA5 levels have been acceptable but TTHM levels have been high at all 8 sampling sites.

According to the Stage 2 DBPR, the annual average value requires 3 quarters of sampling data with the most current period counting twice. Therefore, the City of Flint has not yet experienced a violation of the TTHM MCL because only 2 quarters of data have been obtained. However, levels recorded indicate the likelihood of an MCL exceedance later this year.

A number of issues have been identified as possibly contributing to the high THM levels measured.

1. Inefficient ozone system functionality which has resulted in increased chlorine feed.
2. Upstream influences in terms of increased chlorine demand.
3. Bypass stream around softening contributed to chlorine demand.
4. Unlined cast iron pipes in the distribution system contributing to chlorine demand.
5. Recirculating water in the distribution system due to less than ideal configuration of Cedar Street and West Side pump stations.
6. Broken valves resulting in stagnant water in some areas.
7. High chlorine demand in filters.
8. High THM formation potential (THMFP) in source water.
9. Less than optimal removal of THM precursors

ACTION PLAN

The City of Flint has signed an agreement with the Karegnondi Water Authority (KWA) to purchase raw water drawn from Lake Huron. The KWA system is currently under construction and expected to be operational by late 2016. The water supply from Lake Huron will have entirely different water quality characteristics from the Flint River and those characteristics are expected to yield drastically reduced DPB formation. With that, non-structural options to help reduce THM levels are much preferred over solutions requiring new construction. Therefore, two categories of actions have been devised: Stage 1 being actions that can be completed relatively quickly without major construction and Stage 2 consisting of either long term actions or solutions requiring major construction. The City has completed or intends to complete Stage 1 Actions by February 16, 2015, the week in which the next quarterly sampling is to be done. Stage 2 actions are to be implemented only if Stage 1

4 night runs - Lost 2 over new tubing and

Call to Brent/Robert 12/16/97 - (TTHN selection meeting)

Soon

* Final turnover (after) V retouch two last sys.
* Pt of CS w/ US since summer
  - 1-2 pt - summer
  - Port range -
* Fluoby - more practical
* Trans mission mec Functional - adding 3 = lost 4 valves
* Port Trans - injured ear random - Gelfoam inj
* Repeat Trans valves
  - start valve exercising on spring

LAN to study metabolic study - study 4 hrs week
- comp/flow A-ds

- LAN working on DAN Router
  on Dist Model - done some } study now
  picture study - working on Binder

Actions

* Tear Port off-line
* Softening comp - as much as we can
  - split when filling

(< 15 ml) Out Breaks -

* need better technique (only) 1 cm out 1.5 to 2 cm total Outside rate at Lyle rate

VPO on (Lo) 2 mg/d Amp (Bid) → on-off w/ 15 mg/d (Lo) - not working

updating device

= Ozone - Ozone to come out (new year) to shut - uses system to shut

= Still using a Retrack mixing & vent II not at steroids

actions are ineffective in adequately reducing TTHM levels and therefore Stage 2 is contingent upon the outcome of Stage 1.

Stage 1 – Immediate Actions

- Hire ozone system manufacturer to troubleshoot ozone system
- Bench scale jar testing
  - Match existing process and access possible areas of improvement
  - Simulate potential modifications to treatment process
  - Evaluate coagulation and flocculation polymer aid feeds to assist with TOC removal
- WTP operational changes
  - Discontinue softening bypass stream to reduce chlorine demand
  - Disinfection of filter beds to reduce chlorine demand
  - Possibly begin coagulation and flocculation polymer aid feeds to assist with TOC removal depending on bench scale test results
- Increase water main flushing efforts to minimize stagnant water
- Water system modeling to identify areas with high water age and potential solutions
  - Cedar Street Pump Station potential recirculation
  - West Side Pump Station potential recirculation
  - Storage tank volume use
  - Possible broken closed valve locations
  - Locations in need of flushing
  - Lower high water levels in storage tanks

Stage 2 – Contingent Actions

- Fix ozone system
- Start feeding coagulation and flocculation polymer aids to lower TOC, if not completed in Stage 1
- Convert to lime and soda ash softening
- Change disinfectant to chloramine or chlorine dioxide until KWA
- Install pre-oxidant feed at intake to optimize ozone disinfection
- Implement advanced treatment for THM precursor removal
- Increased main flushing based on water modeling results
- Continue valve replacements with water model assistance
- Emphasize cast iron pipes on water main replacement priority list

Model 4 is running
4th model is overlaying
to DST TILE
→ new eq handrail

- Ozone Rep visited
- another tech - next week 1/19
potential for reprogramming

I. BACKGROUND

The City of Detroit Water and Sewer Department (DWSD) has historically provided drinking water for the City of Flint and Genesee County. In the late 1990's growing concern regarding the reliability of the DWSD supply prompted the City of Flint to upgrade their existing water treatment plant (WTP). Those improvements, defined as Phase I, were completed in 2005 and were intended to allow the Flint WTP to operate, using the Flint River as the source, for an extended period of time in the event that supply from the DWSD was temporarily interrupted. Additionally, the Phase I improvements set the stage for Flint to break free from dependence on the DWSD supply and water charges over which they had no control.

A. WATER SUPPLY TRANSITION

1. Detroit Water and Sewer Department (DWSD)

Until recently the Genesee County and Flint region had been provided drinking water by the DWSD. However, due to excessive cost increases and reliability issues with the DWSD system other options had to be explored.

2. Karegnondi Water Authority (KWA)

In 2010 the Karegnondi Water Authority (KWA) was formed for the purpose of developing a new water supply from Lake Huron to serve the region in lieu of the DWSD supply and the City of Flint elected to join. The KWA expects the new system which is currently being constructed to become operational in the fall of 2016.

3. Flint River – Interim Period

With a renewing water supply agreement between Flint and the DWSD being terminated by the DWSD (effective April 30, 2014) and the KWA system not expected to be operational until late 2016, the City of Flint decided to initiate operation of the existing WTP full time utilizing the Flint River as the interim water source. A variety of WTP improvements were necessary for the Flint plant to become a full time plant. For purposes of this report, Phase II improvements to the Flint WTP are improvements which have been made to allow the plant to operate full time with either the Flint River as the source or the KWA supply as the source.

B. TTHM PENDING VIOLATIONS

The calculation for determining if the MCL has been violated for TTHM is:

(2 x current quarter value + previous 2 quarter values) / 4

Flint has completed tests for 2 quarters and therefore has not violated an MCL limit to date. However, the third quarter of sample data is likely to provide MCL exceedances at all 8 sampling sites. Test results are tabulated below.

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TABLE 1 – 2014 DBP TEST RESULTS						
Sample Location	TTHM			HAA5		
	1st Qrt 5/21/14	2nd Qrt 8/21/14	3rd Qrt	1st Qrt 5/21/14	2nd Qrt 8/21/14	3rd Qrt
1) 3719 Davison - McDonalds	162.4	145.3		64	43	
2) 822 S. Dort Hwy - BP Gas Sta.	111.6	112.0		52	40	
3) 3302 S. Dort Hwy – Liquor Pal.	96.5	127.2		48	31	
4) 3606 Corunna – Taco Bell	106.4	181.3		55	24	
5) 2501 Flushing – Univ. Market	75.1	196.2		38	17	
6) 3216 MLK – Salem Housing	82.2	112.4		41	25	
7) 5018 Clio – Rite Aid	88.2	144.4		49	30	
8) 6204 N. Saginaw – N. Flint Auto	79.2	118.3		50	37	

TTHM MCL = 80 ug/l
HAA5 MCL = 60 ug/l

C. WATER TREATMENT PLANT RECENT IMPROVEMENTS & STATUS

1. Phase I WTP Improvements

Since 1965, the Flint WTP has remained a secondary or backup supply system to the DWSD primary supply. Typically the secondary supply for a public water system is expected to be needed only during emergency situations and normally is designed for short term operation such as providing the average daily demand for a few days. Conversely, Phase I improvements were designed with the intent to upgrade the Flint WTP in order to allow for an extended short term period (6 weeks) because of the perceived high risk that the DWSD supply would fail and remain out of service for an extended duration. Regardless, the Flint WTP was still intended to serve as a standby plant and as such the Phase I improvements lacked redundancies that would be required for a primary supply WTP.

2. Past Pilot Study & Testing

During design of the Phase I improvements a treatability study was completed by Alvord, Burdick & Howson, LLC (AB&H) in 2002. The Treatability Study evaluated the current treatment processes that are in place at the Flint WTP today with the Flint River as the source. The report recommended the following:

TABLE 2 – 2002 WTP TREATMENT RECOMMENDATIONS			
Treatment	Purpose	Point of Application	Dosage (mg/l)
Sodium permanganate	Zebra mussel control	Intake	0.3
Ozone	Taste & odor removal, disinfection	Diffusor basin	1.5
Ferric chloride	Coagulation	Rapid mix	40
Coag aid polymer	Turbidity & TOC removal	Rapid mix	2.0
Floc aid polymer	Turbidity & TOC removal	Floc basin	0.05
Lime	Softening	Softening basin	175
Soda ash	Softening	Softening basin	52
Carbon dioxide	pH adjustment	Recarb basin	37
Media filters	Filtration	Na	Na
Chlorine	Disinfection	Filter effluent	1.0

Of the recommended items, zebra mussel control, coagulant and flocculation polymer aids, and soda ash feed have not been incorporated into the treatment process.

3. Phase II WTP Improvements for Full Time Operation

Phase II WTP improvements are those needed to convert the Flint WTP from a back-up supply to a primary supply plant. A number of improvements have already been constructed as they were necessary to operate full time, treating water from the Flint River. The improvements under the title of Phase II that have been completed or are nearly complete include upgrades to the lime sludge lagoon, the lime sludge lagoon decant and disposal system, decant pump station and force main, installation of mid-point chlorination before filtration, and upgrade of the electric feed sub-station.

Additional improvements to the Flint WTP that are to be completed to become part of the normal treatment process using water supplied by the KWA are:

- New oxygen and nitrogen storage facilities for the ozone system (under construction)
- New coagulant feed system
- Electrical
  - Pump Station #4 upgrades (under construction)
  - SCADA and controls upgrades
  - Filter transfer pump station feeders
- Installation of the future raw water feed connection point for the KWA (under construction)
- Pump replacements and VFD installation in the low and high service pump station (under construction)
- Filter transfer pump station to Dort Reservoir
- Facility security improvements

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II. SOURCE WATER EVALUATION

A. DATA ANALYSIS

Based on past data collected and the 2002 Treatability Study by AB&H, the Flint River water quality varies seasonally with higher hardness and alkalinity experienced in the winter. Higher magnesium concentrations are also experienced in the winter, adding difficulty to the settling process due to neutrally buoyant floc. General water quality average characteristics recorded for the 2002 Treatability Study as compared with average characteristics recorded this year are shown in Table 3 below.

TABLE 3 – FLINT RIVER WATER QUALITY CHARACTERISTICS

Period	Turbidity NTU	TOC Mg/l	Alkalinity Mg/l	Hardness Mg/l as CaCO3	pH	Total Col. Count/day
2001 Apr–Oct	7.9	9.4	215	272	8.1	870-1230 (7300 max)
2014 May–Oct	8.3	10.3 5/22/14	207	252	8.2	1900-9000 (48,300 max)

Other than total Coliform, the Flint River characteristics do not appear to have changed significantly over the past 10+ years. Note that further investigation by City staff revealed a sewer leak upstream of the plant that may have contributed to the total Coliform count. The leak was subsequently repaired.

B. CONCLUSIONS

Considering the minor changes in Flint River water quality, much of the information contained in the 2002 Treatability Study by AB&H remains relevant today. Data from that report assumed to be consistent today include the following:

- Flint River is influenced by groundwater from a dolomitic aquifer
- Hardness varies seasonally with higher hardness and alkalinity in the winter
- Hardness, alkalinity, magnesium concentrations tend to be reduced by run-off
- Total THMFP is likely 380-440 micrograms per liter as measured between April 2001 and January 2002. The City intends to re-test the raw water to confirm the THMFP has not changed. Results are pending.

In development of the 2002 Treatability Study, processes were simulated which resulted in low THMFP. Therefore, information contained in that report will be used to assist with establishing a baseline jar testing procedure as discussed further in Section III.

III. TREATMENT PROCESS EVALUATION

A. EXISTING PROCESS DESCRIPTION

The existing WTP consists of an intake with screening from the Flint River, low lift pumping, ozonation, rapid mix, flocculation, settling, softening, recarbonation, filtration, storage and high service pumping. A process diagram is shown as Figure 1.

1. Intake

A 72" diameter pipe draws water from the Flint River through 2 traveling screens to the low lift pump structure. No chemicals are currently fed for Zebra mussel control or pre-oxidation as recommended by the 2002 Treatability Study. Manual removal of zebra mussels proved to be more economical than installation of chemical feed equipment considering the short term need.

2. Ozone

There are 2 ozone generators designed to provide adequate ozone for a WTP flow of up to 36 mgd. There are 3 ozone contact basins. The ozone generators were designed to produce 900 lbs/day at 10% concentration and up to 1300 lbs/day at 6% concentration each. Recent readings have indicated a production rate of approximately 700 lbs/day at 4% concentration. While serving the purposes of taste and odor control and disinfection, it is possible the current ozone feed might not be optimized to realize additional TOC removal benefits demonstrated by previous tests. Also, less than optimal ozonation has led to increased chlorine feed.

3. Rapid Mix

East and West rapid mix chambers allow chemical feed prior to the flocculation basins. Each rapid mix chamber is equipped with a 5 hp mixer.

4. Coagulation / Flocculation

The WTP contains two equally sized flocculation basins, east and west, and each basin provides tapered or gradually slowed mixing from inlet to outlet. There are fifteen 2 hp mixers for each basin with VFDs to control mixing speed. The 2002 Treatability Study recommended feeding both coagulation and flocculation polymer aids. Neither polymer aid is being used today because turbidity and TOC removals have been sufficient to meet regulatory requirements.

5. Settling

Primary clarification takes place within 3 basins containing plate settlers. The settlers are operating as designed.

6. Softening

Again, there are two basins for softening: east and west. Each basin is 120' in diameter and contains a solids contact softening unit. Each softening basin/unit has a design capacity of 18 mgd. Low lift pumping limitations, flow control to the basins, and fluctuating demands have made it difficult for WTP staff to stabilize the softening process. Softening is accomplished by feeding lime. The decision was made by the City not to feed soda ash in order to remove non-carbonate hardness because acceptable hardness levels could be achieved with lime feed only and softening is short term until Lake Huron water becomes available.

7. Recarbonation
Recarbonation for pH adjustment is accomplished in east and west recarbonation basins between and to the north of the softening basins. Carbon dioxide storage and feed equipment is located west of the recarbonation basins.

8. Filtration
Filtration is accomplished with 12 dual media filters, equally sized and designed to filter 3.0 mgd each. Media consists of 12" of sand and 18" of anthracite. The filters have been operated intermittently over the years due to the standby nature of the WTP and until recently, chlorine injection took place downstream of the filters. It is possible some microbial growth has developed in the filters.

9. Disinfection
Limited disinfection is provided by ozonation, but the primary form of disinfection is chlorine fed prior to filtration and prior to finish water storage / high service pumping. The intermediate chlorine injection location was recently constructed under the Phase II, Segment 1 contract.

10. Clear Well & Pumping
The pump building sits adjacent to a 3 MG clear well and contains both low and high service pumps.

8. JAR TESTS / EXPERIMENTS

1. Approach
There are several well practiced methods by which DBPs can be reduced. First, the disinfectant can be changed to an alternate that has a lower tendency to form DBPs. Second, additional treatment systems such as activated carbon or air stripping (depending on the nature of the precursors) can be added to remove DBP precursors. Lastly, the existing treatment processes can be optimized to remove as much DBP precursor as possible. Of these options, optimizing existing treatment processes is the only strategy that does not require the construction of new and expensive facilities. It is anticipated that Flint will be receiving Lake Huron water in approximately two years and this water will have a completely different chemistry from the Flint River. Major process changes instituted to address THM levels using Flint River water are likely to be unnecessary for Lake Huron water and may even be inappropriate. Therefore, those options which require addition of new treatment processes are undesirable at this time. In recognition of this upcoming change in water source, this study will concentrate on improving the existing processes, rather than adding new ones. New treatment processes will only be recommended if operational changes to the existing treatment train prove ineffective.

Recent sample test results suggest that most of the DBPs are formed in the distribution system rather than within the treatment plant. Therefore, the most logical approach is to reduce the DBP formation potential (DBPFP) rather than simply lowering the levels of DBPs leaving the plant. During bench scale testing, formation potential (FP) levels will be the primary indicator of success or failure of any proposed process modifications.

2. Protocol
Bench scale pilot testing is intended to reflect actual plant operating and hydraulic conditions so the bench scale treatment units will be sized based on various dimensionless factors to ensure the pilot treatment matches the actual system. Bench scale ozonation is not practical due to time and cost limitations. Therefore, water

samples will be withdrawn following the plant ozone basin. These samples will be transported to the laboratory where they will be dispensed into square testing jars. The jars will act as rapid mix, three-stage flocculation, and settling. Rapid mix and flocculation conditions will be matched to the plant based on "Gt" values. The "G" value is a measure of the mixing intensity and is a function of mix time, viscosity of the liquid, and mixing power applied to the water. "Gt" then, is a size scaling factor where time has been accounted for. Settling time will be scaled to match the shorter settling depth of the testing jars. After settling, samples will be decanted from the test jars. The decanted samples will then be lime softened; softening conditions will be similarly matched on the basis of "Gt". Fluoride will be added and carbon dioxide sparged into the samples to reduce the pH. The water will then be vacuum filtered through filter paper, sized to simulate the plant's dual media filters. The samples will be dosed with excess chlorine and allowed to react for seven days before testing for DBPs to determine the formation potential.

Although these conditions may be refined based on new information, we anticipate the following:

TABLE 4 – BENCH SCALE TEST MIXING INTENSITIES

Process	G	Duration
Ozonation	Plant	-
Rapid Mix	330	25 sec
Flocculation, Stage 1	50	9 min
Flocculation, Stage 1	25	9 min
Flocculation, Stage 1	12	9 min
Settling	na	10 min
Softening	TBD	10 min
Recarbonation	na	na

It is expected that the primary variables during the testing will be chemical additions and chemical dosages. Specific chemicals and dosages used for initial testing conditions will be selected to reflect current plant usage and the recommendations of the 2002 Treatability Study.

TABLE 5 – BENCH SCALE TEST CHEMICAL FEED RATES

Chemical	Current Usage	2002 Study
Ozonation	4.66 mg/l	1.5 mg/l
Ferric Chloride	7.7 mg/l	40 mg/l
Coagulant Aid Polymer	Not used	2.0 mg/l
Flocculation Aid Polymer	Not used	0.05 mg/l
Lime	120 mg/l	175 mg/l
Soda Ash	Not used	52 mg/l
Cationic Softening Polymer	3.13 mg/l	Not used
Anionic Softening Polymer	0.88 mg/l	Not used
Fluoride	0.45 mg/l	1 mg/l
Carbon Dioxide	32 mg/l	37 mg/l
Chlorine	6.3 mg/l	1 mg/l

3. Considerations

The 2002 Treatability Study did not note significant formation of DBPs. This may be a function of different Flint River water chemistry at that time. However, recognizing the considerable differences in chemical usage and dosages between that study and current operations, those differences in chemical use and dosage are an obvious starting point for optimizing treatment to prevent DBP limit exceedance.

Although it is believed that optimization of current treatment can correct the DBP issue, should optimization of present treatment prove insufficient, alternate residual disinfectants (chloramines and chlorine dioxide) will be investigated as additional treatment measures.

4. Results

[To be completed following jar testing and experimentation]

5. Conclusions

[To be completed following jar testing and experimentation]

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IV. DISTRIBUTION SYSTEM EVALUATION

EPA guidance for the distribution evaluation portion of an OER is focused on identification and isolation of a specific portion of the distribution system that led to the exceedance. The circumstances of Flint's apparent pending TTHM exeedances are unusual in that a new supply has been implemented which clearly corresponds to the high TTHM sample results. Despite obvious implications to the primary cause of increased TTHM levels, value remains in evaluating the distribution system as there may still be distribution improvements that can be made to help alleviate the problem.

Evaluation of the distribution system, including modeling, was recently added to LAN's scope of services. When finished, information will be provided to complete the following topics in this section.

A. INFRASTRUCTURE

1. Piping

According to the most recent MDEQ Sanitary Survey, the distribution system is estimated to contain 70% cast iron, 20% ductile iron, 2% concrete and 8% steel water mains. Unlined cast iron pipe can become pitted, allowing colonization sites for microorganisms leading to chlorine demand. Additionally, much of the piping in the system is aged and in poor condition. Increased chlorine demand could be resulting from biofilm in older pipes and from main breaks/repairs.

The City utilizes City Point software and GPS equipment to document main breaks and prioritize replacements. Areas that have been targeted for main replacements include Fenton Road, Atherton Road, Dort Highway, Averil Street, and Boulevard Drive. The extent of contribution is not known but any water main replacement project will contribute to decreasing chlorine demand somewhat if constructed properly.

2. Storage

[To be completed]

- *Appropriate capacity*
- *Mixing, baffling, other provided to prevent stagnant water*
- *Condition*

3. Pump Stations

[To be completed]

- *Condition*
- *Pump capacity evaluation*
- *Valve condition and pressure zones*

B. OPERATIONS AND MAINTENANCE

1. Pump Station & Storage Operations

[To be completed]

- *Control of pressure districts*
- *WTP Pump Station (No. 4)*
- *Cedar Street Pump Station*
- *Westside Pump Station*

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- *Torrey Road Pump Station*
- *High and low levels in tanks*

2. Booster Disinfection Practices

Booster disinfection is provided at the Cedar Street and Westside pump stations. Sodium hypochlorite is applied while the reservoirs are being filled.

3. Changes in System Demands

[To be competed]

- *Long term decline in demands*
- *Short term fluctuations – max day in winter due to high volume of main breaks*

C. WATER SYSTEM HYDRAULIC MODELING

[To be completed]

1. Simulation of Existing System

Match existing conditions, particularly chlorine residual. We have chlorine feed data at plant and residuals at 10 locations in each MOR, May-October.

2. Identification of Deficiencies

Specific issues to look at:

Worst case at minimum daily demands
Water age in entire system
Recirculating water through pump stations
Use of storage tanks
Indications of broken valves
Effectiveness of booster disinfection

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V. RECOMMENDATIONS TO MINIMIZE FUTURE OEL EXCEEDANCES

A. SOURCE

The City of Flint has already committed to the change from the Flint River as the water source to Lake Huron under the KWA system, planned for late 2016. The risk of future TTHM limit violations will decline substantially with the use of water from Lake Huron due to much lower DBP precursors. It is important to recognize that the Flint River will become strictly an emergency supply when the KWA supply becomes available and any investments toward the Flint River should be contemplated accordingly. Recommendations discussed below in this section apply to the Flint River as the source.

Reverting to supply from the DWSD until the KWA supply is available as an option. However, the DWSD has stipulated that a $4 million connection fee would apply and current water rates would include approximately $900,000 / month flat fee plus usage charges. Therefore, utilizing the DWSD for interim supply is cost prohibitive under the terms defined by the DWSD.

1. Watershed Management

A volunteer group entitled the Watershed Coalition performs various tasks related to managing the Flint River watershed such as spring cleanups and annual benthic studies to evaluate the river 'health'. No additional action is recommended at this time.

2. Monitoring

The City documents typical raw water characteristics as part of standard preparation of Monthly Operating Reports (MOR). No changes are recommended at this time.

3. Intake Operations

The 2002 Treatability Study recommended pre-oxidation in the form of sodium permanganate as a feed at the intake. However, pre-oxidation with sodium permanganate is unlikely to provide significant oxidizing of organics beyond that provided by ozonation. It is possible the addition of hydrogen peroxide would enhance the ozone process.

4. Seasonal Strategies

Past data indicates the Flint River is influenced by groundwater and in particular, dolomitic spring water. The result is hard water with high concentrations of magnesium and sulfate. Also, hardness and alkalinity are higher during the winter. Upon initiation of supply from the Flint River, the City made the decision to soften with lime only to focus on removal of carbonate hardness. One potential modification that could assist with TOC removal and thus decrease THMFP would be lime and soda ash softening. If implemented soon, the procedural change would be timely as it would also address increased hardness expected going into this winter.

5. Upstream Contamination Issues

Upstream contamination issues are extremely difficult to prevent and even if detected are difficult to locate. Evaluation of raw water data collected for MORs is the easiest manner in which to detect upstream contamination issues because the data is already collected for treatment purposes. In fact, high total Coliform readings signaled a potential issue recently that the City identified and removed.

An upstream monitoring and warning system could be established to attempt to detect spill event type contamination early enough to cease intake prior to the

contamination reaching the WTP. However, given the imminent conversion to the KWA supply, the period of full time use would likely be far too short to achieve payback on the capital expenditures.

B. TREATMENT PROCESS

1. Operational Recommendations

- Coagulation and flocculation polymer aids: The 2002 Treatability Study suggested the use of coagulation and flocculation polymer aids. These polymer aids were shown in the 2002 Treatability Study to increase TOC removal and thereby reduce THMFP. Further evaluation will be completed during jar testing.
- Discontinue softening bypass: The City was previously bypassing a portion of flow around the softening basins because hardness levels did not warrant softening of the full stream. However, this practice was discontinued because it was believed the bypass stream was contributing to chlorine demand and preliminary data has supported that belief. Chlorine demand dropped 0.5 – 1.0 mg/l following elimination of the bypass stream in early November 2014.
- Soften with lime and soda ash: Research has shown that enhanced softening with both lime and soda ash may provide additional TOC removal. The efficacy of this option will be evaluated during jar testing.
- Disinfection of filter beds: In case there has been microbial growth it is recommended the filters be 'shock' treated with chlorine and rinsed. A chlorine injection point was added upstream of the filters during the first segment of Phase II so future growth in the filters should not be an issue.
- Optimization of all existing treatment processes: Depending on bench scale testing conditions and results, slight modifications to all treatment processes might in order to replicate lower DPBFP.

2. Infrastructure Change Recommendations

- Fix and/or replace faulty ozone equipment: Since the ozone equipment was installed it has not been used extensively so the hope is that major components remain in good condition and the system can be easily modified to restore proper functionality. The City has scheduled the equipment manufacturer to field inspect the system on December 15, 2014.
- Change disinfectant to chloramine or chlorine dioxide: If other options prove to be ineffective, conversion to another disinfectant should be fully evaluated. Various characteristics of chloramination indicate an advantage over chlorine dioxide, but a full analysis would provide clarity as to which would be preferred.
- Install pre-oxidant chemical feed: Hydrogen peroxide as a pre-oxidant can enhance the activity of the ozone. This option is listed as a consideration only if problems continue with ozonation.
- Repair upstream sewer leak: a sewer leak upstream of the WTP intake was discovered and has already been repaired by the City.

C. DISTRIBUTION SYSTEM

Recommendations will be incorporated into this report when available. It is anticipated details will be provided for the following topics. [To be completed]

1. ***Manage Water Age***
   a) ***Storage Tanks***
   b) ***Residence Time in Pipes***

2. ***Reduce Disinfectant Demand***
   a) ***Flushing***
   b) ***Cast Iron Pipes***

3. ***Water Modeling of Recommendations***

Determine best flushing locations to reduce water age
Changes to storage tank operating levels to reduce water age
Valves to close/add to improve pressure zones, reduce recirculation
Optimization of pump station use – smaller pumps? Shut down?
Evaluate booster disinfection

A number of actions have already been taken in terms of the distribution system. Water main flushing efforts were increased until late November when freezing weather became prevalent. Also, numerous valves that were broken in the closed position and believed to have been contributing to stagnant water were replaced.

D. BOOSTER DISINFECTION

Decreasing chlorine feed at the WTP and adding booster disinfection in the distribution system is an alternative intended to reduce the reaction time at higher concentrations of chlorine to reduce DPB formation. Extensive looping and branching within the existing system complicate how to best implement and utilize booster disinfection. Water system modeling is recommended to determine the most effective feed point locations and dosages. Further discussion and details will be provided when the distribution evaluation results are available.

E. CATEGORIZATION OF ACTIONS

Considering that the Flint River is being used as the water source only until the KWA supply is available (expected late 2016), options to address high THM formation that require new construction or extensive time to implement are not preferred. On the other hand, the City understands THM sample results to date dictate that some action is necessary. Two categories have been developed to assist the City in prioritizing actions to take. Stage 1 consists of actions that can be completed relatively quickly without major construction and Stage 2 actions are either long term actions or solutions requiring major construction. Stage 1 actions are to be completed first followed by evaluation of the results prior to consideration of Stage 2 actions. Grouping of actions are shown in the table below.

TABLE 6 – ACTION PLAN		
	Action	Purpose
Stage 1	Troubleshoot ozone feed system	Reduce chlorine feed and increase TOC removal
	Bench scale jar testing	Optimize treatment process and evaluate possible modifications
	Discontinue softening bypass	Reduce chlorine demand
	Disinfect filters	Reduce chlorine demand
	Increased water main flushing	Reduce water age / stagnant water
	Water system modeling evaluation	Determine areas with high water age and reasons
	Implement coag. & floc. polymer aids, if appropriate	Increase TOC removal
	Modify booster disinfection feeds, if appropriate	Decrease water age
Stage 2	Repair ozone system	Reduce chlorine feed and increase TOC removal
	Continue increased water main flushing	Reduce water age / stagnant water
	Convert to lime and soda ash softening	Increase TOC removal
	Continue valve replacements based on water model	Reduce water age / stagnant water
	Change disinfectant to chlorine dioxide	Reduce THMFP
	Install pre-oxidant feed at intake	Optimize ozone disinfection, reduce chlorine
	Place priority on replacing cast iron water mains	Reduce chlorine demand

Samples were taken the week of November 17th for the 3rd quarter of testing. Although the City has begun implementation of Stage 1 actions, THM results are not expected to be noticeably affected since there has not been enough time for a response. The next quarter of sampling is due to be completed the third week in February. It is the City's intent to implement Stage 1 actions prior to the 3rd quarter of THM sampling.

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* O3 system needs to be topped off, regardless, for treatment & CT credit even when in RUN

TTHM Reduction
Action taken by City
December 16, 2014

Flint's 3rd quarter of TTHM monitoring (Nov 20th, 2014) shows a reduction in TTHM levels at all of the sampling locations. The reduced TTHMs are the combined result of seasonal variation of total organic carbon (TTHM precursors) in the raw water and action taken by the city towards reducing TTHM levels. The amount of reduction contributed by each factor cannot be determined; however, the following is a list of proactive measures taken by the city in their effort to reduce TTHM levels.

1. **Removed the 20 MGAL Dort Reservoir from service.**

   The reservoir allowed treated water from the WTP to re-circulate back to high service thus adding up to one week of retention time.

2. **Softening 100% of the WTP flow during normal plant operation.**

   Softening the complete flow reduces the chlorine demand. During high water demands (large main breaks, filling reservoirs), split treatment must be utilized due to VFD control problems with the 20 MGD low service pump; however, this is not the main mode of operation.

3. **Improved turn-over of water in distribution system reservoirs.**

   The operating range of the Cedar Street and Westside reservoirs was increased from 1-2 ft. (summer) to approximately 10 feet. The increased drawdown has reduced the residence time and improved chlorine residuals.

4. **Established a more proactive flushing program.**

   Increased flushing helped to reduce residence time in the distribution system and, especially, at dead-ends.

5. **Optimizing Transmission System Operation w. repair of major valves and confirming proper valve position.**

   Several critical valves were replaced on one of Flint's four major transmission mains and several other valves (found to be closed) were opened. This eliminated stagnation problems in areas near this main, improved chlorine residuals and allows the main to operate in a looped configuration.

Action to be taken soon:

- **LAN treatability study – jar testing (Starting this week)**
- **Trouble shoot Ozone system – early January**
- **Disinfect filters – after the next "top-off" of system reservoirs**

Prysby, Mike (DEQ)

From: Busch, Stephen (DEQ)
Sent: Wednesday, December 17, 2014 4:29 PM
To: Wurfel, Brad (DEQ)
Cc: Prysby, Mike (DEQ)
Subject: Flint Drinking Water Actions

Brad,

Here are some of the actions Flint has been taking to address the TTHM levels.

1. Removed the 20 Million Gallon Dort storage reservoir from service to prevent stagnant water conditions.
2. Softening 100% of water instead of partial softening to reduce amount of chlorine needed
3. Modified operation of water storage tanks to increase turn over and reduce stagnant water volumes.
4. Increased frequency of water main flushing to reduce detention time and stagnant water conditions.
5. Repair transmission water mains and valves to allow direct flow patterns and reduce detention time.

The City is also working on these additional items:

1. Further optimization of the enhanced coagulation process, possible use of polymer chemicals
2. Optimization of the ozone treatment process
3. Enhanced cleaning of filters to help reduce amounts of chlorine needed for disinfection

Mike Prysby can provide additional information as needed.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

City of Flint Water Plant DBP
Distribution System Sampling Site Locations

Site ID #	Routine Site Name & Address	Up-Stream Site Name & Address	Down-Stream Site Name & Address
DBP #1 (previously DBP 3)	McDonalds Restaurant 3719 Davison Rd. Flint, MI 48506	Arby's Restaurant 3742 Davison Rd. Flint MI 48506	Admiral Gas Station 3802 Davison Rd. Flint, MI 48506
DBP #2	BP Gas Station 822 S. Dort Hwy. Flint, MI 48503	Advasure Insurance 810 S. Dort Hwy. Flint, MI 48507	Rite-Aid Pharmacy 2838 E. Court St. Flint, MI 48506
DBP #3 (previously DBP 2)	Liquor Palace 3302 S. Dort Hwy. Flint, MI 48507	Mattress Savers 3124 S. Dort Hwy. Flint, MI 48507	Premier Insurance 3316 S. Dort Hwy. Flint, MI 48507
DBP #4	Taco Bell 3606 Corunna Rd. Flint, MI 48532	Rite Aid Pharmacy 3521 Corunna Rd. Flint, MI 48532	McFalls Collision 3614 Corunna Rd. Flint, MI. 48532
DBP #5 (previously DBP 4)	University Market 2501 Flushing Rd. Flint, MI. 48504	Consumer Services 2702 Flushing Rd. Flint, MI. 48504	Rube's Bar 1117 N. Chevrolet Ave. Flint, MI. 48504
DBP #6	Salem Housing 3216 M. L. King Blvd. Flint, MI 48505	BP Gas Station 3317 M.L. King Blvd. Flint, MI. 48505	Hinky Dinky Market 3110 M.L. King Blvd. Flint, MI. 48505
DBP #7	Rite-Aid Pharmacy 5018 Clio Rd. Flint, MI 48504	Urban League of Flint 5005 Cloverlawn Dr. Flint, MI. 48504	Clio Coin Laundry 4930 Clio Rd. Flint, MI. 48504
DBP #8 (previously DBP 3)	North Flint Automotive 6204 N. Saginaw St. Flint, MI 48505	Al & Jerry's Mini-mart 6101 N. Saginaw St. Flint, MI 48505	Hutchinson's Food & Drug 6509 N. Saginaw St. Flint, MI 48505

DBP Sampling Frequency – 8 samples quarterly

- Routine samples are collected during the 3rd full week of February, May, August, & November.
- Prior to April 2014, four (4) samples were required under EPA Stage 2 DBP. Those sites are included in our current 8 samples, and are changes in site codes are indicated in red.
- Due to initial high levels of TTHM after full time operation in April, extra samples have been collected from our Cedar St. & West Side pump stations/reservoirs, to help us determine beneficial operational procedures.

Prysby, Mike (DEQ)

From: Michael Glasgow <mglasgow@cityofflint.com>
Sent: Wednesday, December 10, 2014 12:42 PM
To: Prysby, Mike (DEQ)
Subject: Re: Stage 2 DBP Monitoring Plan
Attachments: Nov 2014 MOR Scan.pdf; DBP Distribution System Sampling Site Locations.docx

Mike,

Good afternoon. I don't believe we sent a formal copy of our DBP monitoring plan to reflect the change for full time operation. Prior to April 2014, the Stage 2 DBP monitoring sites were: DBP 1 - 3719 Davison Rd, DBP 2 - 3302 S. Dort Hwy., DBP 3 - 6204 N. Saginaw St., DBP 4 - 2501 Flushing Rd. After April, our monitoring schedule showed that we had to collect 8 DBP samples quarterly. With only 8 distribution sites (disregarding the reservoirs) we use every site in Bacteriological Sample Site Plan. Site #1 is now DBP 1, Site #2 is now DBP 2, an so on. We continued on the same sample time schedule as before April: The 3rd full week of February, May, August, & November. I have attached a copy of the "rough" DBP sample monitoring plan.

I have also attached a copy of the November 2014 MOR, a hard copy will be sent out today.

On Tue, Dec 9, 2014 at 11:15 AM, Prysby, Mike (DEQ) <PRYSBYM@michigan.gov> wrote:

Brent, Michael

Can you e-mail us a copy of Flint's most recent Stage 2 DDBP monitoring plan (updated plan to reflect full-time operation of the WTP – after April 25th)? We need to confirm site codes for the various TTHM/HAA5 sampling locations. Thanks…

Michael Prysby, P.E.

District Engineer

Office of Drinking Water and Municipal Assistance

517 290-8817

Current Stage 2 DDBPR Monitoring Schedules

02310 FLINT, CITY OF

DBP1 3719 DAVISON ROAD

1 per QT	Peak: 5/1 - 5/31	TOTAL HALOACETIC ACIDS (HAA5)	
1 per QT	Peak: 5/1 - 5/31	TTHM	

DBP2 3302 SOUTH DORT HIGHWAY

1 per QT	Peak: 5/1 - 5/31	TOTAL HALOACETIC ACIDS (HAA5)	
1 per QT	Peak: 5/1 - 5/31	TTHM	

DBP3 6204 NORTH SAGINAW STREET

1 per QT	Peak: 5/1 - 5/31	TOTAL HALOACETIC ACIDS (HAA5)	
1 per QT	Peak: 5/1 - 5/31	TTHM	

DBP4 2501 FLUSHING ROAD

1 per QT	Peak: 5/1 - 5/31	TOTAL HALOACETIC ACIDS (HAA5)	
1 per QT	Peak: 5/1 - 5/31	TTHM	

DBP5 3606 CORUNNA RD

1 per QT	Peak: 5/1 - 5/31	TOTAL HALOACETIC ACIDS (HAA5)	
1 per QT	Peak: 5/1 - 5/31	TTHM	

DBP6 5018 CLIO RD

1 per QT	Peak: 5/1 - 5/31	TOTAL HALOACETIC ACIDS (HAA5)	
1 per QT	Peak: 5/1 - 5/31	TTHM	

DBP7 3216 MLK BLVD

1 per QT	Peak: 5/1 - 5/31	TOTAL HALOACETIC ACIDS (HAA5)	
1 per QT	Peak: 5/1 - 5/31	TTHM	

DBP8 822 S DORT HWY

1 per QT	Peak: 5/1 - 5/31	TOTAL HALOACETIC ACIDS (HAA5)	
1 per QT	Peak: 5/1 - 5/31	TTHM	

DISINFECTION BY-PRODUCTS - DEQ Required Testing

MCL for TTHM = 80 ug/L . MCL for HAA5 = 60 ug/L

	May-14		Aug-14		Nov-14		Feb-15		LRAA		MAX	MIN
	TTHM	HAA5	TTHM	HAA5	TTHM	HAA5	TTHM	HAA5	TTHM	HAA5	TTHM	TTHM
Water Plant Tap	56	36	86	36	**33**	36		36	58.3	36.0	86.0	33.0
	*Once Yearly (June 2014)		*Once Yearly (June 2014)		*Once Yearly (June 2014)		*Once Yearly (June 2014)		*Once Yearly (June 2014)			
Site # 1	162.4	64.0	145.3	43.0	58.6	16.0	16.2	9.0	95.6	33.0	162.4	16.2
Site # 2	111.6	52.0	112.0	40.0	36.2	21.0	19.9	9.0	69.9	30.5	112.0	19.9
Site # 3	96.5	48.0	127.2	31.0	33.3	15.0	16.8	9.0	68.5	25.8	127.2	16.8
Site # 4	106.4	55.0	181.3	24.0	33.9	15.0	18.1	9.0	84.9	25.8	181.3	18.1
Site # 5	75.1	38.0	196.2	11.0	93.6	24.0	24.5	9.0	97.4	20.5	196.2	24.5
Site # 6	82.2	41.0	112.4	25.0	50.1	5.0	28.5	2.0	68.3	18.3	112.4	28.5
Site # 7	88.2	49.0	144.4	30.0	53.6	17.0	19.2	9.0	76.4	26.3	144.4	19.2
Site # 8	79.2	50.0	118.3	37.0	41.1	18.0	14.9	9.0	63.4	28.5	118.3	14.9

*Sampled at end of Oct.

DISINFECTION BY-PRODUCTS - Other TTHM Investigations

	Jul-14	Aug-14	Nov-14
	TTHM	TTHM	TTHM
Dort Reservoir	153.3	n/a	n/a
Cedar Street Reservoir	n/a	163.3	35.2
West Side Reservoir	n/a	134.4	43.9

In house investigation using Parker TTHM Analyzer provided by United Water Affiliate

	10/16/2014	10/17/2014	10/21/2014	10/29/2014
	TTHM	TTHM	TTHM	TTHM
3 MG Well (PS #4)	48.8	49.9	32.2	34.9
+ 1 hour	54.7	52.8	39.2	n/a
+ 48 hours	n/a	n/a	n/a	116.6
+ 170 hours	n/a	n/a	n/a	168.0

Total Organic Carbon (mg/L)

	Raw	Final
May	10.30	4.57
June	9.00	3.63
July	8.44	2.67
August	8.48	4.06
Sept	7.36	3.30
Oct	7.38	2.99
Nov	7.27	3.86
Dec	6.49	2.59
Jan	7.62	3.21
Feb	5.95	2.07

TTHM Media Inquiry
January 5, 2015

I received a media inquiry from Ron Fonger of the Flint Journal concerning the TTHM MCL violation in the city of Flint. Ron was provided with a copy of our December 16, 2014 Violation Notice letter to the city of Flint concerning the TTHM violation. Ron was also provided with a draft press release on Jan 4th concerning measures being taken by the city to address the TTHM violation. Below is a summary of the questions asked by Ron and my response.

- **How common are TTHMS in Michigan and are there other systems in violation?**

  TTHMs are found in systems that disinfect with CL2 due to the reaction between CL2 and naturally occurring organic compounds (total organic carbon - TOC) in the raw water. There is one other system (customer supply of Saginaw) that has exceeded the TTHM standard. Since this is outside of my district, I do not know the details of the violation.

- **How widespread are the high TTHM levels in Flint?**

  TTHM is monitored at 8 locations throughout the city. Compliance is based on a Locational Running Annual Average (LRAA) meaning that any one location will put the city out of compliance with the TTHM standard if that location fails to meet the standard based on the running annual average (RAA) of 4 quarters of monitoring. The LRAA was exceeded in just 3 quarters at two of the eight locations due to high TTHM concentrations at these locations(May and August quarters).

- **What level of concern should city residents have?**

  TTHMs are a health concern associated with long-term (chronic) exposure as opposed to other contaminants such as pathogenic organisms (fecal coliform, giardia, crypto, etc.) which are short-term concerns…ie…immediate impact to public health. The potential health effects provided in the notice are possible with

long term exposure over a significant portion of the person's lifespan. Consumption of drinking water with TTHMs at this concentration does not pose an immediate threat to public health.

- The most recent test results (November) appear much better; what do residents need to know for the future?

  The decline in TTHMS is two-fold. First, the decline is the result of the city taking pro-active measures in collaboration with the DEQ to address the TTHM concentrations that includes: optimizing current treatment, shortening residence time in water storage reservoirs, optimizing ozone treatment, and improving operation of the distribution system (flushing, repairing valves, and opening valves to eliminate areas of stagnation).

  Next, seasonal variation also contributed to the reduction in TTHM levels as the TOC loading from the Flint River watershed diminishes during the winter months. T

  The city is also pursuing additional treatment options (enhanced coagulation) to help remove TOC and filter cleaning to reduce CL2 demand. Hydraulic modeling of the distribution system will also be performed to further optimize operation of the system reservoirs and pumping stations aimed at reducing stagnation. These efforts combined with steps already taken are expected to dampen higher TTHM levels during the 2015 summer months.

- There has been some criticism regarding the timing of the notice…ie…why weren't residents notified during earlier when high TTHM results were being obtained?

  The city was not in the position to provide a notice since the results obtained last summer did not place the city into a violation status. Also, since TTHMs pose a health concern with term-term exposure ….and in anticipation of exceeding the standard by the end of 2014, the city elected to pursue a proactive approach towards reducing TTHMs (treatment & distribution operation). The city also worked with the DEQ in this effort along with preparation and distribution of the mandatory public notice within 30 days of the start of the violation (December 1, 2014). I

also explained how the LRAA is calculated and why the first two quarters did not constitute a violation.

- **What triggers the TTHM violation?**

As mentioned above, if exceedance of the LRAA (based on 4 quarters of results) occurs at ANY of the eight sampling locations the city is in violation. The LRAA can also be exceeded in less than four quarters (based on a 4-quarter calculation) if the concentration is high enough.

Flint NBC 25 News Interview
Flint TTHMs
January 5, 2015

Walter-Smith Randolth, reporter, from Flint NBC 25 News conducted a telephone interview with me for broadcast on Flint local television concerning the TTHM violation in Flint's drinking water. I led the interview and provided Mr. Randolth an opportunity for follow-up questions. Below is a summary of topics that were presented.

<u>TTHM violation – What does this mean for Flint residents?</u> The TTHM violation notice to residents is not an immediate public health emergency since the health-effects posted in the notice require long-term exposure to TTHMs (over a significant portion of an individual's lifespan). TTHMs commonly occur in public water systems that disinfect with chorine due to the reaction between chlorine and naturally occurring organic compounds (total organic carbon) in the source water. Surface water sources, including the Flint River watershed, typically have higher levels of naturally occurring organic compounds.

<u>What is the DEQ's Role?</u> The DEQ is working in collaboration with the city to ensure long-term public health protection and to keep the public informed. We are working with the city to help identify improvements in treatment and operation of the distribution system to reduce the levels of TTHMs. We are assisting the city with public notice requirements (when to post/contents). With our assistance, the city has proceeded with an operational evaluation of the water system ahead of state and federal requirements.

<u>DEQ's perspective of the situation:</u> The Flint River source is more difficult to treat since it requires more disinfection to maintain bacteriological intergrity. Increased disinfection; however, when combined with higher levels of naturally occurring organics results in elevated levels of TTHMs that form over time out in the distribution system. The TTHM concentrations that developed in the system were more than anticipated due to several reasons:

1. **Flint did not immediately change their mode of distribution system operation after switching sources to account for higher TTHM formation potential of treated water from Flint's WTP.**

I explained that TTHMs require time to form and are not fully developed in the treated water that enters the distribution system from the WTP. Water from Detroit; however, is several days old when it reaches Flint; thus the majority of the TTHMs are developed. TTHMs were also lower given the source water (Lake Huron). Flint's historically operated the distribution system in a manner that created conditions favorable for stagnation. This methodology of operation was not changed (initially) when switching to the Flint River; thus, this condition was one of several factors contributing to higher levels of TTHMs. Other factors included; higher TTHM formation potential in the Flint River (already explained above) and higher chlorine application rates at treatment plant to maintain bacteriological integrity.

I further explained that TTHM levels in the most recent quarter have dropped for two main reasons:

1. **Action taken by the city including; improving dist. system operation to reduce stagnation, treatment changes (complete softening), reduced chorination, system flushing, valving improvements**

2. **Seasonal fluctuation of organic compounds in the Flint River. Less organic loading in the winter months.**

END of MY DISCUSSION

Mr. Smith-Randolf asked for my comment to the following questions/statements....Why this problem is occurring in Flint? Is there a problem with the water system? This was not an issue when Flint was on Detroit water.

I responded by summarizing some of the key points discussed above including:

- **Dist system operation (storage facilities and valving)**
- **TTHM formation potential in Flint River vs. Detroit and age of incoming water**
- **High chlorine dosages to maintain bacteriological integrity**
- **Treatment practices at WTP (partial by-pass of softening)**

SAFE OR NOT SAFE

- City has violated a drw std
  - to say SAFE OR UNSAFE is not as definitive as a
- Not pot. Health
  - Not on immed. public concern since TTHMs are a based on chronic (long-term) exp.
    - short term exp. to long-term contaminant has diff impact on each indiv based on their background → Med. issue prev. exposure
    - Each indiv is different & if concerned should seek advice w. Health care provider to take steps to ↓ risk

Meeting with Rep. Neeley and Rep. Phelps
Flint TTHMs
January 6, 2015

Richard Benzie, Sarah Howes, and I met with State Representatives Sheldon Neeley, 34th District and Phil Phelps 49th District to discuss the TTHM violation in Flint's drinking water. Several follow-up questions were asked during and after our discussion. Information provided to Mr. Neeley and Mr. Phelps was in a format similar to that provided in the NBC-25 News interview. We focused on:

What does the TTHM violation mean for Flint residents?

The violation does not pose an immediate public health threat since the health-effects requires long-term exposure to TTHMs (over a significant portion of an individual's lifespan).

TTHMs commonly occur in public water systems that disinfect with chorine due to the reaction between chlorine and naturally occurring organic compounds (total organic carbon) in the source water.

Reason(s) for the violation:

The Flint River source is more difficult to treat since it requires more disinfection to maintain bacteriological integrity; however, this leads to more TTHM formation.

Flint did not immediately change their mode of distribution system operation after switching sources to account for higher TTHM formation potential of treated water from Flint's WTP. Historically, their mode of operation created areas of stagnation in the distribution system which then contributed to the higher levels of TTHMs.

Ongoing Efforts:

The city is working in collaboration with the DEQ towards identifying improvements in treatment to remove TTHM precursors and optimize distribution system operation. The city has already taken action on some of these measures including: complete softening to reduce chlorine dosage and increased turnover of water in the distribution system storage reservoirs to

reduce stagnation. The city is also correcting valving deficiencies to further reduce stagnation.

The city has received scrutiny on the perceived delay to inform residents of the high TTHM levels; however, we stressed that the city has met the state and federal requirements for public notification of this particular contaminant. We explained the rational for determining compliance with the TTHM standard and how this correlates to the public notification requirements. We also informed Mr. Neeley and Mr. Phelps, that TTHM compliance is determined on a RAA (based on 4 quarters); thus, the city will likely remain in violation even with one or two subsequent quarters producing results that are below the MCL.

We also suggested, in addition to meeting our public notification requirements, it may be helpful for the city to explain to their residents how compliance with TTHMS is determined and, more importantly, keep them informed (snapshot in time) of each quarter's results (regardless of compliance status).

Result of On-going Efforts

Efforts taken by the city resulted in a significant reduction of TTHMs in the November 2014 quarter. Seasonal fluctuation of organic loading in the Flint River watershed (less loading in the winter months) also contributed to lower TTHMs.

Questions that were asked:

Can the State become involved with additional TTHM monitoring (third party monitoring)? How would the cost be covered?

The city may elect to conduct additional TTHM monitoring; however, this would be at the city's expense. DEQ staff, depending on availability, may be able to assist in the monitoring. Additional monitoring could be eligible as part of future compliance calculations; however, the monitoring protocol must be approved by the DEQ.

Are the operators at the Flint WTP properly certified?

Yes. The city has an F-1 operator, Mike Glasgow who oversees treatment

operation and is the designated OIC. There are also several F-2 operators including Brent Wright (WTP Supt.). The city has also hired additional operators for full-time plant operation. Many of these operators acquired their F-4 certification last fall.

Flint Water Forum
TTHM MCL Violation
January 21, 2015
7:00pm

- **Explanation of violation – What Does this mean?**

Not an Acute public health threat

Regs Long-term exposure

Occs with disinfection

Std is a balancing act

↓ Risk w. microbial — balances w. ↑ Risk TTHM

Std dtm. by Acceptable risk (Factor) Cost Avail. tech

- **Role of the DEQ**

working collaboratively w. city to ensure

- long term Pubic health protection / informed
  - Ed treatment Improves } Op. Eval of
  - Opt. dist. oper. } System

– City has taken Action (ahead of MANDATES) & levels have improved significantly

SAFE?

- City has violated a std.
- Has taken Action to Address Vio
- Working w. DEQ & current levels are Sig. better
- Long term Concern Vs. short term (acute) impact

Std. developed by dtm. of acceptable risk

Factors ↓

cost
tech. Avail
Benefit

Toxicology

Not toxicologists/Med Specialist

It was our understanding – subgroups more susceptible to Microbial Contam./Acute nature

Flint Water Forum
TTHM MCL Violation
January 21, 2015
7:00pm

- **Explanation of violation – What Does this mean?**

Not An Acute Public health threat

Long-term exp.

Occurs w. disinfection → Cl_2 + Nat. Organics

Std dtmd by EPA → Acceptable risk vs. Cost vs. Avail tech.

- Std is Black & White
- Risk is Not As line is crossed
  Relative ↑ in Risk as you cross line is Not sig / compared to Microbial Contaminants

- **Role of the DEQ**

- Establish (Provide) guidelines / requirements for city to meet ∑ WQ Stds / PN / treatment based on city's choice of source
- Work collaborate / w. city to ensure long term Public Health protection / informed
  - WTP improvements = removal of Organics = alt. disinfectant, ↓ Cl_2
  - Dist imp. – ↓ stag / unlving corrections
- City initiated Action

City of Flint

Public Forum

Wednesday January 21, 2015
7:00 pm City Hall Dome

AGENDA

Opening COF – DPW Director - Howard Croft

- Forum Ground Rules (disorderly conduct will not be tolerated)
- Overview of Format (each guest to speak for ~10 minutes with written questions afterword)
- Recognition of Officials
- Introduction of Guests

1st Speaker DEQ – Local Representatives - Mike Prysby, Steve Busch

- Role of DEQ
- Explanation of TTHM violation

2nd Speaker LAN – Lead Engineer - Warren Green

- Discuss Engineering role
- Discuss Operational Evaluation Report

3rd Speaker MSU Microbiologist – Dr. Joan Rose

- Risk Assessment (what do the numbers mean?)
- What to do if someone suspects they are at risk
- What about the elderly and those with a weak immune system
- What will the next violation mean (water is still safe)

4th Speaker GCDC – Jeff Wright

- What to expect from KWA raw water as source
- Update on KWA timeline

Final COF – DPW Director – Howard Croft

- Summary (Next Steps – Action Plans)
  - Hiring an industry expert
  - Tours of Treatment Plant
  - Continued communication
  - Planned steps (CIP built on , Water Reliability Study, Operational Evaluation Report)
  - Funding (researching all sources, state funding, federal opportunities)
  - Water & sewer rates (budgetary evaluation upcoming)
- Questions (Expected to have an hour of panel response time)
- Conclusion - Thank the panel, (Additional follow up at next Public Works Committee meeting)

Department of Environmental Quality (DEQ)

Michael Prysby, P.E.
District Engineer

Stephen Busch, P.E.
Lansing and Jackson District Supervisor

Lockwood, Andrews, and Newnam (LAN)

J. Warren Green, PE
Senior Associate, Director of Engineering

Warren has more than 30 years of experience in engineering management and supervision of complex water treatment and transmission facilities projects. He has successfully guided water system improvements through all necessary phases including feasibility studies, pilot testing, design, financial evaluation, land acquisition, construction, start-up and operation. His expertise is in the areas of facilities design, construction management and contract administration.

He has worked with several municipal utility clients throughout Illinois, Mississippi, Michigan and Wisconsin. He worked with the Green Bay Water Utility in Green Bay, Wis., for 12 years, serving as a project manager for a number of design and contract administration tasks. These included the expansion of a 10-mgd raw water pumping station, construction of approximately 17 miles of 54-in. steel water transmission main, and expansion of its water treatment plant in 1997 and 2004. He also oversaw a $376 million project in DuPage County, Ill., where he was responsible for contract administration and construction management of 140 miles of water transmission mains.

MSU Water Quality and Environmental Microbiology Laboratory

Dr. Joan B. Rose, Ph.D.
Laboratory Director/Principal Investigator
Homer Nowlin Chair in Water Research
Co-Director Center for Water Sciences
Co-Director Center for Advancing Microbial Risk Assessment

Joan is an international expert in water microbiology, water quality and public health safety and is a member of the National Academy of Engineering. She has been involved in the investigation of numerous waterborne outbreaks world-wide. Her work addresses the use of new tools for surveying and mapping water pollution for recreational and drinking water; assessment of water treatment technology and use of risk assessment.

Degrees:

- Bachelor's (1976) and Ph.D. (1985), microbiology, University of Arizona
- Master's (1980) microbiology, University of Wyoming

Genesee County Drain Commissioner

Jeff Wright

Past positions include:

- Chief Executive Officer of Karegnondi Water Authority
- Legislative Committee and Executive Board of Michigan Association of County Drain Commissioners
- Northeast District Chairman – Michigan Association of County Drain Commissioners
- Former Secretary/Treasurer – Michigan Association of County Drain Commissioners

- THANK City for Invite
- THANK Residents for Attending
  - opp. to have Q's ANS is important

TAP water
- MMO comp people/subgroups
- NOT sterile
- CARE-over the long to all vibs

Community Water Supply

Information Regarding

Total Trihalomethane (TTHM)

Disinfection Byproducts

(1)

DEQ - Community Water Supply

- Regulatory Authority over Public Water Systems
- Michigan Safe Drinking Water Act (Act 399) – Adm Rules
- 1400 Community Supplies in MI (like Flint) Eg. Unique, RAW well cust
- Lansing Jackson Districts – 300 in 13 counties source Dist
- Oversight through:
  - Inspection Visits/surveys
  - Monitoring – Provide Stds – Treatment Dist. → T1 H M
  - Construction Permitting – Review/Approve design → Act 399 permit
  - Planning – 5yr/20yr needs – R.S./DWRF
- Partnership and Compliance Assistance
  - DEQ works collaboratively w. PWS on solutions to correct WR Problems
  - We assist w. compliance on the Alternative chosen by the PWS

What are TTHM's

Trihalomethanes occur when natural organic matter in the water react with chlorine disinfectants. (Byproduct of disinfection process)

4 Chemical Compounds made up of these elements:

- Carbon
- Hydrogen
- Bromine
- Chlorine

Form the 4 main Constituents of TTHMs →

Bromoform
Chloroform
Bromodichloromethane
Chlorodibromomethane

Bromo-Di-chloromethane
Chloro-Di-Bromomethane

TTHM Standard

Not An Acute Pub. Health Concern that Microbial contam. poses

- Based on chronic exposure to low doses
- 80 parts per billion (0.080 ppm) – will be ref. in next slide
- Locational Running Annual Average (LRAA) ← compliance is BASED ON
- Quarterly monitoring at each location ← conducted on
- Location and timing based on highest risk — Longest res time in syst.
- Running = over last 4 quarters, not calendar yr
- Total sum of 4 quarters not to exceed 320 ppb → See table

→ Dist Mon./Not @ WTP due to disinf. byprod. whose conc. varies (↑) with travel time in dist.

Flint TTHM Results

TTHM Results (mg/L)					
	5/21/14	8/21/14	11/20/14	LRAA	OEL
DBP1 McDonalds 3719 Davison	**0.162**	**0.145**	0.059	**0.092**	**0.106**
DBP2 Liquor Palace 3302 S. Dort Highway	**0.112**	**0.127**	0.033	0.068	0.076
DBP3 North Flint Auto 6204 N. Saginaw St.	**0.097**	**0.118**	0.041	0.064	0.074
DBP4 University Market 2501 Flushing Road	**0.106**	**0.196**	**0.094** (396)	**0.099**	**0.122**
DBP5 Taco Bell 3606 Corunna Road	0.079	**0.181**	0.034 (294)	0.074	**0.082**
DBP6 Rite-Aid Pharmacy 5018 Clio Road	**0.088**	**0.144**	0.054	0.072	**0.085**
DBP7 Salem Housing 3216 MLK Boulevard	**0.082**	**0.112**	0.050	0.061	0.074
DBP8 BP Gas Station 822 S. Dort Highway	0.075	**0.112**	0.036	0.056	0.065

Started Same as Dec

DEQ Rec OEL

8 locations 3 monthly sum ↓ LRAA ↓ assume 4th ↓ OEL

Inc Evil

effort

City proactively starting before Q3

SG ↓ in trying to achieve

Potential Health Effects Related to TTHM

provided by - EPA

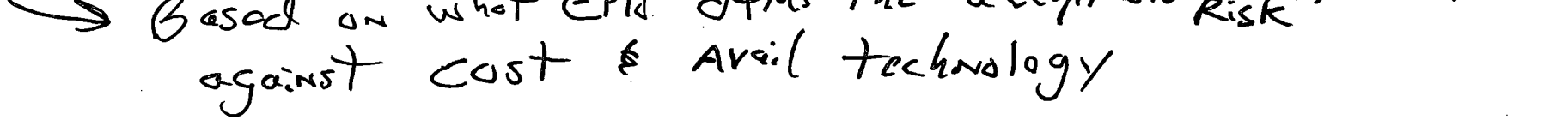
- Federal Language
- Some people who drink water containing TTHM in excess of the MCL over many years could experience liver, kidney, or central nervous system problems and increased risk of cancer.

Conveyed to Residents in PN

while I'm not a toxicologist → Explain the Basis →

Health Effect Basis

- Toxicology Studies - Uncertainty in using results of high-dose studies in animals to estimate risk to humans from chronic exposure to low doses in drinking water
- Epidemiology – Findings are contradictory. No conclusion of causal link between exposure and health effects.
- EPA determined evidence supports a potential hazard concern and establishment of standard.
- ~~Considered best~~ course of action at this time to reduce potential risks.



Flint took steps proactively to work at Sept - Nov Reported 12/1

↓ TTHMs After 2nd Round

TTHM Violation Requirements

In collaborate effort w. DEQ → prep. OEL WTP/Dist Des — upcoming slide

Shown the ability to meet std

Nov samples

- Water supply must take steps to reduce the amount of TTHM so that they are below the standard.
- Water supply must notify customers of the violation within 30 days of after learning of the violation.

~~Dec Mail & Other accepted~~

Via. established after Results of Nov 2014 confirm MCL via. City informed by DEQ on 12/16

Operational Evaluation

Report due every 90 days following estab. of MCL via 12/1 → 3/1

1. System treatment practices
2. System distribution practices
   - Storage tank operations
   - Excess storage capacity

   ↑ drawdown to ↓ stagnation
   - Distribution system flushing — ↓ stag — valving ΔCS
   - Source water quality
   - Treatment changes
   - TTHM contributions

   ↑ contact — periods of higher loading
   — Removal of precursors prior to disinfect
9. Steps to minimize future standard violations

Public Notification

objective;

- Designed to provide information to the customer to make more informed decisions
- Short term exposure to long term contaminant has different impact on each individual based on their background
- If health effects had been acute notification would be provided in 24 hours with specific actions for customers

Med issues - Prev exposure

Info on Pot Risk & current time status

Each indiv is diffaent - if concerned - Advice on health care Provider to take steps to ↓ risk

Progress to take step to ↓ risk

Each indiv is different - if concerned - Advice re: Medical Care

re on Pat Risk & Current time Status

Prysby, Mike (DEQ)

From: Wurfel, Brad (DEQ)
Sent: Thursday, January 22, 2015 10:43 AM
To: Prysby, Mike (DEQ); Busch, Stephen (DEQ)
Cc: Shekter Smith, Liane (DEQ); Karen Tommasulo
Subject: Fwd: Flint water

Mike, can you please contact Robin Erb at the Free Press?
I provided her and essential briefing, as she had not previously covered this issue.
But my remarks were on background.
Thanks.
b
Sent from my iPhone

Begin forwarded message:

> **From:** "Erb, Robin" <rerb@freepress.com>
> **Date:** January 22, 2015 at 10:39:18 AM EST
> **To:** "WurfelB@michigan.gov" <WurfelB@michigan.gov>
> **Subject: Flint water**
>
> Thanks for the time just now; it was nice to speak to you again.
>
> I'd love to connect with Mike as soon as he has a few minutes. I'm also hoping to nail down a timeline for the boil advisories, the dates of the samples that were problematic, when DEQ notified Flint of the exceedance problems, and the dates of meetings that DEQ has had with residents.
>
> My direct line is 313-222-2708. My cell is PPI
>
> Again, many thanks.
>
> (And really, I don't think you're crazy to hang out on a slab of ice waiting for fish. Nope, not at all. Weirdo.)

Robin Erb
Detroit Free Press Medical Writer
160 W. Fort Street
Detroit, MI 48226
Metro desk: 313-222-6601
Direct line: 313-222-2708

Follow me on Twitter @Freephealth

TTHM Sample Results - January 2015

Extra sampling not connected with the regulatory sampling schedule

Sample Date	Site ID	Bromoform (ug/L)	Chlorodibromomethane (ug/L)	Chloroform (ug/L)	Dichlorobromomethane (ug/L)	Total Trihalomethanes (ug/L)
1/27/2015	D.S. #1	1.6	9.4	12	12	35
1/27/2015	D.S. #2	1.1	6.5	7.1	7.9	23
1/27/2015	D.S. #3	1.1	6.6	7.0	8.0	23
1/27/2015	D.S. #4	1.2	7.0	7.6	8.2	24
1/27/2015	D.S. #5	1.6	9.5	12	12	35
1/27/2015	D.S. #6	1.7	8.7	12	11	33
1/27/2015	D.S. #7	1.2	7.7	9.9	10	29
1/27/2015	D.S. #8	1.0	6.1	6.3	7.1	21
1/27/2015	C.S.	1.1	6.6	7.5	8.0	23
1/27/2015	W.S.	2.2	14	23	21	60
1/27/2015	City Hall	1.6	11	19	16	48
1/27/2015	W.S.C.	1.7	10	13	13	38
1/27/2015	Plant Tap	0.76	4.3	4.9	5.6	16
1/27/2015	C.F.E. North	<0.50	1.7	2.2	2.4	6.3
1/27/2015	C.F.E. South	<0.50	1.2	1.8	1.8	4.8

Normal Distribution Samples

Water Plant Samples & Reservoirs

Other Distribution System Sites

Minimum Concentration (ug/L):	4.8
Maximum Concentration (ug/L):	60

city supply ON-line TTHM analyzer — 3 can
Oz — pressure well — extractor
to one mile 2nd opinion
key cl2 lab

1/27 SW Park 2/19/15

Turbidity – 2 wells Fam/PAC
Ex. Arsenol – Unable to ~~detect~~ eliminate WTP

ORP → Flow ↑ Feed ↓ TOM Not
& Flow Add pdys to ↓ Turbidity (Thoughy)
Not work
Fail PAC ~~✓~~ – F Feelers work
↳ iP good, Now just to replacement

Soda Ash – very helpful – Buy cost 500-600
800 Lbs/Day – Avg 650
↳ CLOSED

* Any way to get city in explosive
Private Avg 15 Administrative Ruling

O_3 system Repaired & up & running good

100% softening – Every 5 hr running

KMnO4 – Also – Use last & d. pre/post T.C

Stage 1 – Immediate Actions

- Hire ozone system manufacturer to troubleshoot ozone system
  - Manufacturer and controls programmers have performed on site evaluations
- Bench scale jar testing
  - Match existing process and assess possible areas of improvement
    - Existing process simulated, evaluation of existing chemical feed dosage adjustments partially complete
  - Simulate potential modifications to treatment process
    - Soda ash softening evaluation partially complete, PAC feed yet to be tested
  - Evaluate coagulation and flocculation polymer aid feeds to assist with TOC removal
    - Evaluation of polymer aids partially complete
- WTP operational changes
  - Discontinue softening bypass stream to reduce chlorine demand
    - Operational directive has been set to soften no less than 90% of flow
  - Disinfection of filter beds to reduce chlorine demand
    - Utility Service Group has been contracted by City and condition assessment is currently underway
  - Possibly begin coagulation and flocculation polymer aid feeds to assist with TOC removal depending on bench scale test results
    - Polymer aids still being evaluated, but increased ferric dose implemented
- Increase water main flushing efforts to minimize stagnant water
  - Flushing efforts ongoing
- Water system modeling to identify areas with high water age and potential solutions
  - Cedar Street Pump Station potential recirculation
  - West Side Pump Station potential recirculation
  - Storage tank volume use
    - Increased reservoir output to reduce detention time
  - Possible broken closed valve locations
    - Model has been updated with known broken valve locations. Model results are being evaluated for indications of other possible broken valves. City has also initiated valve assessment program.
  - Locations in need of flushing
    - High water age areas have been identified in the water model. Further evaluation forthcoming to determine most effective flushing points.
  - Lower high water levels in storage tanks
    - Operating levels of all reservoirs have been lowered to reduce water age

Stage 2 – Contingent Actions

- Fix ozone system
  - Some repairs have been made to gauges and programming and the system is producing adequate ozone. Cleaning and additional minor repairs are forthcoming.
- Start feeding coagulation and flocculation polymer aids to lower TOC, if not completed in Stage 1

    - Alternative comparison and cost effectiveness being evaluated
- Convert to lime and soda ash softening
    - Alternative comparison and cost effectiveness being evaluated
- Change disinfectant to chloramine or chlorine dioxide until KWA
- Install pre-oxidant feed at intake to optimize ozone disinfection
- Implement advanced treatment for THM precursor removal
- Increased main flushing based on water modeling results
- Continue valve replacements with water model assistance
- Emphasize cast iron pipes on water main replacement priority list

Tom Henry
858-3678
Apt 1903

Flint - TAC - 6 Comm. fm GCDC

Prysby, Mike (DEQ)

From: John O'Brien <jfobrien@gcdcwws.com>
Sent: Friday, February 20, 2015 8:43 AM
To: 'Howard Croft'; donna. cole; gdn2@aol.com; Kirk Smith; larry.koehler@mcc.edu; mgavuli1@hurleymc.com; Mike Lane; Prysby, Mike (DEQ); Pete Levine; rosejo@msu.edu; Russell.Hudson@mclaren.org; Brent Wright; Daugherty Johnson; Michael Glasgow; rob.nicholas@veolia.com
Cc: Flint Mayor; Gerald Ambrose; Elizabeth Murphy; David Gadis; Jason Lorenz
Subject: RE: Technical Advisory Committee Update

Howard
In review of both the Veolia and IRM they are both similar recommendations except for one item
Water softening this item needs to be resolved to soften or not
The technical committee can not answer this question
Until this is decided we can not discuss the treatment process
John O'Brien

From: Howard Croft [mailto:hcroft@cityofflint.com]
Sent: Thursday, February 19, 2015 3:52 PM
To: donna. cole; gdn2@aol.com; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; mgavuli1@hurleymc.com; Mike Lane; Mike Prysby (DEQ); Pete Levine; rosejo@msu.edu; Russell.Hudson@mclaren.org; Brent Wright; Daugherty Johnson; Howard Croft; Michael Glasgow; rob.nicholas@veolia.com
Cc: Flint Mayor; Gerald Ambrose; Elizabeth Murphy; David Gadis; Jason Lorenz
Subject: Technical Advisory Committee Update

Team,

I have include a list of all of the current participants in the Technical Advisory Team. We are targeting Wednesday March 4th as the first meeting and the time and place are yet to be determined. I have listed a few items to help craft the direction that we are hoping to go with this team;

1. We will likely have a conference number as well as a physical meeting place in case someone is not able to be there.

2. We will define as we go along how often to hold meetings, but we plan to continue throughout the implementation of the KWA.

2. We will start with a general scope and set of deliverables but will look for open input from the group in order to develop additional specifics as to what each member would like to accomplish.

3. Certainly with this assembled team we would want to develop a set of medical FAQ's that would assist the medical community with current and future details of chemicals and risk assessments.

4. We will discuss the treatment process and look at the national discussion on whether or not to use fluoride as well as what additional regulations are possibly being considered the EPA for the future.

5. We will look at what is upcoming with the KWA and water from Lake Huron. What will the chemical challenges be? What will the final product entail?

6. We will evaluate testing options or partners and determine if there is an avenue or demand for such.

These are some of the topics that I plan to delve into and I believe that we have assembled a professional team that can bring enlightenment to all of us. I look forward to working with each of you.

Respectfully Submitted,

--

Howard Croft
Public Works Director
City of Flint
1101 S. Saginaw Street
Flint, MI 48502
PH# 810.766.7135 Ext.2043
hcroft@cityofflint.com

Prysby, Mike (DEQ)

From: Brent Wright <bwright@cityofflint.com>
Sent: Friday, February 20, 2015 9:11 AM
To: Prysby, Mike (DEQ)
Subject: Re: call

Mike

Marvin Gnagy from Veolia wanted to talk with you about some of the suggestions they were making for treatment here at the plant. He wanted to know what could be implemented right away and what might need permit approval from the MDEQ. They were here running test all week but left yesterday. I have listed his contact number and email below. I would appreciate it if you could get in contact with him so he can finalize his report and send his recommendations to the city administration.

Marvin Gnagy
419-450-2931
marvin.gnagy@veolia.com → called Marvin Gnagy on 2 Feb 2015 → see notes on Back-9

Thank you

On Fri, Feb 20, 2015 at 8:40 AM, Prysby, Mike (DEQ) <PRYSBYM@michigan.gov> wrote:

Brent,

Are we having a conference call today? I am available, give me a time for the call and I will make my-self available.

Michael Prysby, P.E.

District Engineer

Office of Drinking Water and Municipal Assistance

517 290-8817

--
Brent Wright

Water Plant Supervisor
City of Flint
4500 N. Dort Hwy.
Flint, MI. 48505
Ph: 810.787.6537 ext. 3510
Fx: 810.787.3710

(2/20/14)

① Review Front ends & 90s — JAR tests

Can @ WTP to L TTHMs

Alum Clam Hydrate for Better ↓TOC — CP.

May Recc it

↗ Moved to OEL 1.3

& will likely recc high for Fern disease

② Reviewing, want May ↓

may recc ↓ time disinfectant Min. Headloss off Basins

③ Removal on Anthracite & sep GAC on Filters

— Maintain GAC on pilot basis in the anthracite?

④ Re-looking @ CT in summer months

— CT — summer w. ↑ temp & Elim. CL

Pool opinion of Filters

we will need to agree on #'s for op. Δ in summer

⑤ 2 stage coag. — most. in clarif.

— & some in

elim polymer

Sodium permanganate

pre oxi

10 mg/l Ferric

Fe — Clarification

20 — just start of softening

⑥ kMnO4 / (NaMnO4) — prior to O3 — could → more young Jr. chemists

of O3 — .5 — no mg/l in TAR studies

& GAC Rem. pathogens? — may will it react w. Ozone

CITY OF FLINT

Department of Public Works

Dayne Walling
Mayor

Gerald Ambrose
Emergency Manager

Howard Croft
Director

Technical Advisory Committee Members,

On behalf of the City of Flint, I want to thank you for your willingness to participate in the City of Flint Technical Water Advisory Committee. This committee was formed to address many of the issues related to water that have arisen in our community over the past 10 months.

The first meeting is scheduled for Wednesday March 4th, 2015 from 2:00 – 4:00 pm at Flint City Hall. At our first meeting we will hear an overview from the engineer of record Lockwood Andrews & Newnam, and a review of the assessment findings and recommendations from our consultant Veolia North America.

We welcome the addition of a USEPA Representative that will be present at the first meeting as well as our other distinguished participants. For those that cannot be present in person we have established the ability to participate via a conference line.

For conference access please call PPI conference number PPI.

Regards,

Howard D. Croft
Public Works Director
City of Flint

Prysby, Mike (DEQ)

From: Howard Croft <hcroft@cityofflint.com>
Sent: Friday, February 27, 2015 10:26 AM
To: Brent Wright; Daugherty Johnson; Dayne Walling; donna. cole; gdn2@aol.com; Howard Croft; James Henry; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; mgavuli1@hurleymc.com; Michael Glasgow; Mike Lane; Prysby, Mike (DEQ); Natasha Henderson; Pete Levine; rob.nicholas@veolia.com; rosejo@msu.edu; Russell Hudson; Samir Matta; Warren Green; jmikewright
Subject: First Technical Team Meeting
Attachments: TAC Invitation Letter.pdf

Technical Team Members,

This is a reminder of our first meeting date next Wednesday March 4th at Flint City Hall at 2:00 - 4:00 pm. Please bring any questions or goals that you would like to see developed out of the group as we will create the final overarching agenda in the committee.

On a side note, our February TTHM test results were returned from the state lab this morning and all eight test sites are substantially below the MCL.

I look forward to seeing everyone on Wednesday.

Regards,

--
Howard Croft
Public Works Director
City of Flint
1101 S. Saginaw Street
Flint, MI 48502
PH# 810.766.7135 Ext.2043
hcroft@cityofflint.com

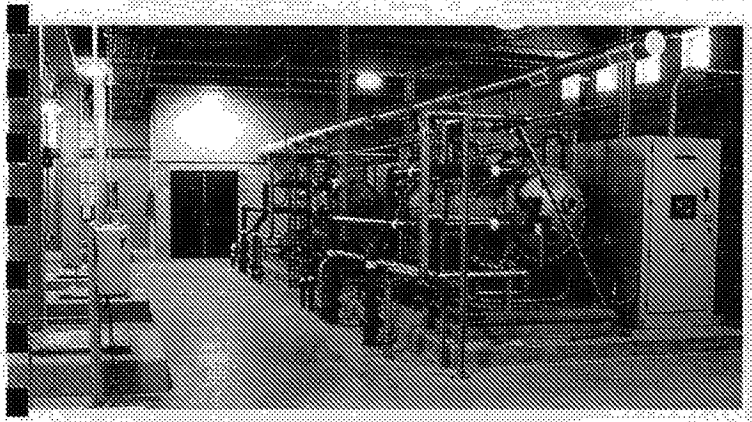
Operational Evaluation Report
City of Flint

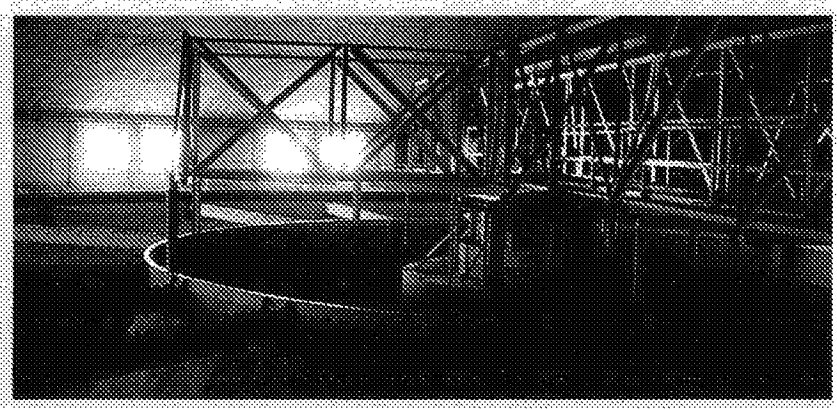
FINAL

Trihalomethane Formation Concern

DEQ
RESOURCE MANAGEMENT DIVISION
MAR 27 2015
LANSING DISTRICT

February 27, 2015







Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY

City of Flint
Operational Evaluation Report
March 1, 2015
MDEQ Comments

1. Revise Tables 2 and 3 on Page 7 to account for proper alignment of DDBP samples (results, location, site code). Also, revise statement on Page 1 regarding the number of sites exceeding the TTHM MCL following the 4th quarter sample cycle.

2. The ozone system was recently repaired. (Page 10 & 19). What is the ozone system's current production rate?

3. The city's hydraulic model (prepared by Potter Consulting) is being updated (Page 16). Is the model currently sufficient in determining proper sizing for the transmission main replacement in DuPont & Bishop Street corridor? (currently sized at 24-inch) (Pages 5, 16, and 20)

4. Are the potassium permanganate results & conclusions available? (Pages 4 and 17)

5. We agree that some reduction in storage volume could be achieved without compromising reliability; however given high usage, main breaks, and "let runs" during the winter, storage volume remains important. We agree with the need to determine adequate storage volume which will likely differ between summer and winter. (Page 15)

6. We agree with the concern of re-circulation of water pumped from the booster pump stations; however, we were recently informed of existing distribution system check valves to prevent recirculation. These appurtenances and their condition need to be confirmed. The hydraulic model may also need to be updated to include these valves. (Page 15)

7. We concur with the recommendation to provide the ability to monitor raw water TOC and PTAP TTHM. (Pages 17 & 18)

8. Page 20 provides 2 options to manage water age and each option includes reducing the utilized storage volume of the 3 MGAL well to 2 MGAL. The reduction in storage volume limits the WTP's ability to meet CT under worst case conditions (low temp, high pH, 30 MGD pumping rate from reservoir).

9. Table 11 on Page 21 outlines an Action Plan for Stage 1 and Stage 2 actions. Several actions listed in Stage 2 including; repair of ozone system, continued valve replacement, and replacement of deteriorated watermains are longer term solutions; however, they need to proceed regardless of the outcome of TTHM reduction.

Lockwood, Andrews & Newnam, Inc.

PLANNING

ENGINEERING

PROGRAM MANAGEMENT

Est. 1936

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CHICAGO, IL
CLEARWATER, FL
COLLEGE STATION, TX
DALLAS, TX
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FORT WORTH, TX
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To: Mr. Michael Prysby	**Date** 02-27-15
	Project Number 130-10701-001
Company: MDEQ	**Routing:**
Address: 525 WEST ALLEGAN STREET Lansing, MI 48933	
Project: City of Flint Water OER	

We Are Sending You:		These Are Transmitted:
☐ Shop Drawings	☒ Reports	☐ As Requested
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☐ Specifications	☐ As Noted	☐ For Your Signature

Quantity	Description
2	Final Operational Evaluation Report for THM

Remarks

These updated plans are being issued for bidding and are intended to replace the two sets that were submitted to your office last week.

DEQ
RESOURCE MANAGEMENT DIVISION
MAR 0° 2015
LANSING DISTRICT

Distribution	Prepared By
1- Daugherty Johnson 2- Brent Wright 3- File	Jeffrey Hansen, PE

1311 SOUTH LINDEN ROAD
SUITE B
FLINT, MI 48532
TEL 810.820.2682
FAX 810.820.2703
www.lan-inc.com

If enclosures are not as noted, kindly notify us at once.

6-018-0

EXECUTIVE SUMMARY

Environmental Protection Agency (EPA) and Michigan Department of Environmental Quality (MDEQ) regulations require that public water suppliers test drinking water quarterly throughout the distribution system for disinfectant by-products (DBP's). Two categories of DBP's, tri-halomethanes (THM) and halo-acetic acids (HAA5), are regulated and must be tested for. The City of Flint began operation of their water treatment plant (WTP) full time with the Flint River as the source on April 25, 2014. Since that time, four quarters of samples taken have resulted in an annual average violation for total THM. Prior to the first violation (Nov. 2014), the City hired Lockwood, Andrews & Newnam, Inc. (LAN) to complete this Operational Evaluation Report (OER) in conformance with EPA guidelines with the goal to determine the cause(s) of high levels of THM and evaluate possible solutions.

The EPA promulgated the Stage 2 Disinfectants and Disinfection By-Products Rule (DBPR) in January 2006 which set maximum contaminant levels (MCLs) for total trihalomethanes (TTHM) and HAA5 based on an annual running average, tested quarterly, for a given sampling location. The City of Flint reports levels from 8 sampling test locations. Of the four quarterly sampling cycles since Flint began operating the WTP full time, HAA5 levels have been acceptable but TTHM levels were high at 4 sampling sites following the third sampling cycle. Average THM levels exceeded the MCL at 3 sites following the fourth sampling cycle.

A number of issues have been identified as possibly contributing to the high THM levels measured.

1. Inefficient ozone system functionality which has resulted in increased chlorine feed.
2. Upstream source influences in terms of increased chlorine demand.
3. Bypass stream around softening contributed to chlorine demand and increased total organic carbon (TOC) levels in the effluent.
4. Unlined cast iron pipes in the distribution system contributing to chlorine demand.
5. High water age in the distribution system due to:
   a. Broken valves causing less than ideal flow patterns.
   b. Inefficient pump station pressure zones
   c. Water storage volumes in excess of that needed for today's demands.
   d. Oversized water mains
   e. Low water demands
6. High chlorine demand in filters.
7. High THM formation potential (THMFP) in source water.
8. Less than optimal removal of THM precursors

A graphical representation of how the factors above relate to the timing of THM compliance sampling is shown as Table 1. Compliance sampling dates are hatched. Each row in Table 1 describes a factor than can lead to increased THM levels and the table defines when each of those factors applied. Note the convergence of nearly all factors around the second sampling period on August 21, 2014 to create what appears to be a worst case scenario. The table also shows that the factors listed as those that the City can control have been addressed prior to the February sampling period. Monthly operating report data up to February 1,2015 is depicted on the Table.

TABLE 1 - SUMMARY OF NEGATIVE INFLUENCES ON THM COMPLIANCE SAMPLING

FACTOR	2014								2015	
	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Softening bypass stream over 20% of plant flow										
Ozone system not feeding optimally										
Using full water storage capacity of WSR & CSR										
Chlorine feed at WTP 7.0 mg/l or more										
Ferric chloride feed rate less than 10 mg/l Fe3+										
Raw water temp 23 degrees C or more										
Raw water TOC levels above 8.0 mg/l										
Raw water coliform over 5000 counts/day										
Positive bacteria test in dist. system (boil water notice)										
Water demand less than 15 mgd										

Dates of occurrence
Dates of occurrence and expected to repeat in future years
Compliance sampling date

Factors under Flint staff control
Flint River characteristics
System factors

ACTION PLAN

The City of Flint has signed an agreement with the Karegnondi Water Authority (KWA) to purchase raw water drawn from Lake Huron. The KWA system is currently under construction and expected to be operational by late 2016. The water supply from Lake Huron will have entirely different water quality characteristics from the Flint River and those characteristics are expected to yield drastically reduced DPB formation. With that, non-structural options to help reduce THM levels are much preferred over solutions requiring new construction. Therefore, two categories of actions have been devised: Stage 1 being actions that can be completed relatively quickly without major construction and Stage 2 consisting of either long term actions or solutions requiring major construction. The City is actively working to complete Stage 1 actions as soon as possible. Stage 2 actions are to be implemented only if Stage 1 actions are ineffective in adequately reducing TTHM levels and therefore Stage 2 is contingent upon the outcome of Stage 1. As of the date of this report, status updates for action items are shown in red.

Stage 1 – Immediate Actions

- Hire third party water quality expert to complete independent 'water audit'
  - The City hired Veolia Water to review all water quality related operations, procedures, actions taken and planned responses. Recommendations from Veolia are expected by the first week in March 2015.
- Obtain an in house THM analyzer to allow regular operational monitoring of THM levels
  - THM analyzer was installed 2/17/15.
- Hire ozone system manufacturer to troubleshoot ozone system
  - Manufacturer and controls programmers performed on site evaluations in January 2015. ⟶ Findings ?
- Bench scale jar testing
  - Match existing process and assess possible areas of improvement
    - Existing process was simulated and an evaluation of existing chemical feed dosages has been completed by LAN.
    - Existing process TOC profile was developed by Veolia.
  - Simulate potential modifications to treatment process
    - Soda ash softening evaluation completed and PAC feed testing completed by LAN.
  - Evaluate coagulation and flocculation polymer aid feeds to assist with TOC removal
    - Evaluations of polymer aids completed by LAN and PVS Technologies.
- WTP operational changes
  - Discontinue softening bypass stream to reduce chlorine demand
    - Operational directive has been set to soften no less than 80% of flow.
  - Disinfection of filter beds to reduce chlorine demand
    - Utility Service Group contracted by City and condition assessment completed. Controls improvements have been completed.
  - Begin coagulation and flocculation polymer aid feeds to assist with TOC removal if bench scale test results are positive
    - Jar testing completed to date has not indicated a useful benefit to feeding coagulation/flocculation polymer aids. Increased ferric doses have been implemented at the WTP based on positive jar test results.

Based on [illegible] w. Maximum [illegible]

- Increase water main flushing efforts to minimize stagnant water
  - Flushing efforts are ongoing as weather permits.
- Water system modeling to identify areas with high water age and potential solutions
  - The water model has been improved and preliminary results, including system wide water age, have been produced. Water demand updates and reconciliation with operator's data are scheduled for March 2015 to complete water modeling analysis.
  - Cedar Street Pump Station potential recirculation
    - Water model analysis to be completed in March 2015.
  - West Side Pump Station potential recirculation
    - Water model analysis to be completed in March 2015.
  - Storage tank volume use
    - Operating levels of West Side and Cedar Street reservoirs have been lowered to reduce water age.
  - Possible broken closed valve locations
    - Model has been updated with known broken valve locations. Model results are being evaluated for indications of other possible broken valves. City has also initiated valve assessment program.
  - Locations in need of flushing
    - High water age areas have been identified in the water model. Further evaluation forthcoming to determine most effective flushing points.

Stage 2 – Contingent Actions

- Fix ozone system
  - Repairs have been made to gauges and programming and the system is producing proper ozone and functioning under manual operation. Further minor repairs are planned for the 1st quarter 2015 to allow automatic operation.
- Start feeding coagulation and flocculation polymer aids to lower TOC, if not completed in Stage 1
  - Polymers evaluated by LAN did not demonstrate notable benefit.
  - PVS Technologies evaluated a proprietary polymer that showed little benefit.
- Convert to lime and soda ash softening
  - Cost effective analysis to be developed, if necessary, based on routine operation THM level monitoring.
- Change disinfectant to chloramine or chlorine dioxide until KWA
  - Cost effective analysis to be developed, if necessary, based on routine operation THM level monitoring.
- Install pre-oxidant feed at intake to optimize ozone disinfection
  - Permanganate feed at intake was evaluated by Veolia the week of 2/16/15 and recommendations are expected by the first week in March 2015.
- Replace filter media with granular activated carbon (GAC) media
  - Cost effective analysis to be developed, if necessary, based on routine operation THM level monitoring.
- Implement advanced treatment for THM precursor removal
  - Cost effective analysis to be developed, if necessary, based on routine operation THM level monitoring.
- Increased main flushing based on water modeling results
  - Water model analysis to be completed in March 2015.

- Continue valve replacements with water model assistance
  - Water model analysis to be completed in March 2015.
- Emphasize cast iron pipes on water main replacement priority list
  - Flint has bid replacement of over 2 miles of 24" cast iron pipe along Dupont and Bishop Streets to be completed this coming construction season. The water main section is considered a critical transmission main, and is expected to contribute to decreases in water age when complete

THM samples have been taken and tested 5 times since the City began using the Flint River for supply. Four sets of samples were taken for official regulatory compliance and one set of samples was taken by the City for operational monitoring. Samples were taken in May 2014, August 2014, November 2014, January 2015, and February 2015. THM levels at all sample sites have declined from August 2014 to February 2015. The average of all sample sites in August was 142.1 ug/l and the most recent average of samples taken in February 2015 was 19.8 ug/l. The MCL defined by the EPA is 80 ug/l.

I. BACKGROUND

The City of Detroit Water and Sewer Department (DWSD) has historically provided drinking water for the City of Flint and Genesee County. In the late 1990's growing concern regarding the reliability of the DWSD supply prompted the City of Flint to upgrade their existing water treatment plant (WTP). Those improvements, defined as Phase I, were completed in 2005 and were intended to allow the Flint WTP to operate, using the Flint River as the source, for an extended period of time in the event that supply from the DWSD was temporarily interrupted. Additionally, the Phase I improvements set the stage for Flint to break free from dependence on the DWSD supply and water charges over which they had no control.

A. WATER SUPPLY TRANSITION

1. Detroit Water and Sewer Department (DWSD)

Until recently the Genesee County and Flint region had been provided drinking water by the DWSD. However, due to excessive cost increases and reliability issues with the DWSD system other options had to be explored.

2. Karegnondi Water Authority (KWA)

In 2010 the Karegnondi Water Authority (KWA) was formed for the purpose of developing a new water supply from Lake Huron to serve the region in lieu of the DWSD supply and the City of Flint elected to join. The KWA expects the new system which is currently being constructed to become operational by the fall of 2016.

3. Flint River – Interim Period

With a renewing water supply agreement between Flint and the DWSD being terminated by the DWSD (effective April 30, 2014) and the KWA system not expected to be operational until late 2016, the City of Flint decided to initiate operation of the existing WTP full time utilizing the Flint River as the interim water source. A variety of WTP improvements were necessary for the Flint plant to become a full time plant. For purposes of this report, Phase II improvements to the Flint WTP are improvements intended to allow the plant to operate full time with either the Flint River as the source or the KWA supply as the source.

B. TTHM VIOLATIONS

The EPA and MDEQ method of determining if TTHM sample results exceed the MCL uses a locational running annual average (LRAA). Flint's first TTHM violation was cited by the MDEQ following the third cycle of sampling completed in November 2014. Of the 8 sampling sites, 4 were in violation. At that time the MDEQ used the following calculation for determining if the MCL had been violated:

(2 x current quarter value + previous 2 quarter values) / 4 = Operational Evaluation Value

Flint has now completed tests for 4 quarters and a straight annual running average applies. Based on samples taken on February 17, 2015 the number of sites in violation of the THM MCL limit has decreased to three. The City also conducted a round of sampling on January 27, 2015 in order to internally monitor the progress of actions taken to address the THM issue. It is worth noting that each round of sampling since August of 2014 has indicated a significant drop (improvement) in THM levels. Test results are tabulated in Table 2. HAA5 sample results are shown in Table 3, of which Flint has had no violations.

TABLE 2 – TTHM TEST RESULTS (ug/L)						
Sample Location	1st Qrt 5/21/14	2nd Qrt 8/21/14	3rd Qrt 11/21/14	Inter. 1/27/15	4rth Qrt 2/17/15	LRAA
WTP Tap	56	86	33	16	-	na
1) 3719 Davison McDonalds	162.4	145.3	58.6	35	16.2	95.6
2) 822 S. Dort Hwy BP Gas Sta.	111.6	112.0	36.2	23	19.9	69.9
3) 3302 S. Dort Hwy Liquor Palace	96.5	127.2	33.3	23	16.8	68.5
4) 3606 Corunna Taco Bell	106.4	181.3	33.9	24	18.1	84.9
5) 2501 Flushing Univ. Market	75.1	196.2	93.6	35	24.5	97.4
6) 3216 MLK Salem Housing	82.2	112.4	50.1	33	28.5	68.3
7) 5018 Clio Rite Aid	88.2	144.4	53.6	29	19.2	76.4
8) 6204 N. Saginaw N. Flint Auto	79.2	118.3	41.1	21	14.9	63.4

TTHM MCL = 80 ug/l

TABLE 3 – HAA5 TEST RESULTS (ug/L)						
Sample Location	1st Qrt 5/21/14	2nd Qrt 8/21/14	3rd Qrt 11/21/14	Inter. 1/27/15	4rth Qrt 2/17/15	LRAA
WTP Tap	36 (taken June 14, 2014)					na
1) 3719 Davison McDonalds	64	43	16	Na	9.0	33.0
2) 822 S. Dort Hwy BP Gas Sta.	52	40	21	Na	9.0	30.5
3) 3302 S. Dort Hwy Liquor Palace	48	31	15	Na	9.0	25.8
4) 3606 Corunna Taco Bell	55	24	15	Na	9.0	25.8
5) 2501 Flushing Univ. Market	38	17	24	Na	9.0	22.0
6) 3216 MLK Salem Housing	41	25	5	Na	2.0	18.3
7) 5018 Clio Rite Aid	49	30	17	Na	9.0	26.3
8) 6204 N. Saginaw N. Flint Auto	50	37	18	Na	9.0	28.5

HAA5 MCL = 60 ug/l

C. WATER TREATMENT PLANT RECENT IMPROVEMENTS & STATUS

1. Phase I WTP Improvements

Since 1965, the Flint WTP has remained a secondary or backup supply system to the DWSD primary supply. Typically the secondary supply for a public water system is expected to be needed only during emergency situations and normally is designed for short term operation such as providing the average daily demand for a few days. Conversely, Phase I improvements were designed with the intent to upgrade the Flint WTP in order to allow for an extended short term period (6 weeks) because of the perceived high risk that the DWSD supply would fail and remain out of service for an

extended duration. Regardless, the Flint WTP was still intended to serve as a standby plant and as such the Phase I improvements lacked redundancies that would be required for a primary supply WTP.

2. Past Pilot Study & Testing

During design of the Phase I improvements a treatability study was completed by Alvord, Burdick & Howson, LLC (AB&H) in 2002. The Treatability Study evaluated the current treatment processes that are in place at the Flint WTP today with the Flint River as the source. The report recommended the following:

TABLE 4 – 2002 WTP TREATMENT RECOMMENDATIONS

Treatment	Purpose	Point of Application	Dosage (mg/l)
Sodium permanganate	Zebra mussel control	Intake	0.3
Ozone	Taste & odor removal, disinfection	Diffusor basin	1.5
Ferric chloride	Coagulation	Rapid mix	40
Coag aid polymer	Turbidity & TOC removal	Rapid mix	2.0
Floc aid polymer	Turbidity & TOC removal	Floc basin	0.05
Lime	Softening	Softening basin	175
Soda ash	Softening	Softening basin	52
Carbon dioxide	pH adjustment	Recarb basin	37
Media filters	Filtration	N/A	Na
Chlorine	Disinfection	Filter effluent	1.0

Of the recommended items, zebra mussel control, coagulant and flocculation polymer aids, and soda ash feed have not been incorporated into the treatment process.

3. Phase II WTP Improvements for Full Time Operation

Phase II WTP improvements are those needed to convert the Flint WTP from a back-up supply to a primary supply plant. A number of improvements have already been constructed as they were necessary to operate full time when treating water from the Flint River. The improvements under the title of Phase II that have been completed or are nearly complete include installation of the future raw water feed connection point and valving for the KWA supply, upgrades to the lime sludge lagoon, the lime sludge lagoon decant and disposal system, decant pump station and force main, installation of mid-point chlorination before filtration, and upgrade of the electric feed sub-station.

Additional improvements to the Flint WTP that are to be completed to become part of the normal treatment process using water supplied by the KWA are:

- New oxygen and nitrogen storage facilities for the ozone system (under construction)
- New coagulant feed system
- Electrical
  - Pump Station #4 upgrades (under construction)
  - SCADA and controls upgrades
  - Filter transfer pump station feeders
- Pump replacements and VFD installation in the low and high service pump station (under construction)
- Filter transfer pump station to Dort Reservoir
- Facility security improvements

II. SOURCE WATER EVALUATION

A. DATA ANALYSIS

Based on past data collected and the 2002 Treatability Study by AB&H, the Flint River water quality varies seasonally with higher hardness and alkalinity experienced in the winter. Higher magnesium concentrations are also experienced in the winter, adding difficulty to the settling process due to neutrally buoyant floc. General water quality average characteristics recorded for the 2002 Treatability Study as compared with average characteristics recorded in 2014 are shown in Table 5 below.

TABLE 5 – FLINT RIVER WATER QUALITY CHARACTERISTICS

Period	Turbidity NTU	TOC Mg/l	Alk. Mg/l	Hardness Mg/l as CaCO3	pH	Total Col. Count/day	THMFP Mg/l
2001 Apr–Oct	7.9	9.4	215	272	8.1	870-1230 (7300 max)	410
2014 May–Oct	8.3	10.3 5/22/14	207	252	8.2	1900-9000 (48,300 max)	187

The Flint River characteristics do not appear to have changed significantly over the past 10+ years. Note that further investigation by City staff revealed a sewer leak upstream of the plant that may have contributed to the total Coliform count. The leak was subsequently repaired.

B. CONCLUSIONS

Considering the minor changes in Flint River water quality, much of the information contained in the 2002 Treatability Study by AB&H remains relevant today. Data from that report assumed to be consistent today include the following:

- Flint River is influenced by groundwater from a dolomitic aquifer
- Hardness varies seasonally with higher hardness and alkalinity in the winter
- Hardness, alkalinity, magnesium concentrations tend to be reduced by run-off

In development of the 2002 Treatability Study, processes were simulated which resulted in low THM levels. Therefore, information contained in that report will be used to assist with establishing a baseline jar testing procedure as discussed further in Section III.

III. TREATMENT PROCESS EVALUATION

A. EXISTING PROCESS DESCRIPTION

The existing WTP consists of an intake with screening from the Flint River, low lift pumping, ozonation, rapid mix, flocculation, settling, softening, recarbonation, filtration, storage and high service pumping. A process diagram is shown as Figure 1.

1. Intake

A 72" diameter pipe draws water from the Flint River through 2 traveling screens to the low lift pump structure. No chemicals are currently fed for Zebra mussel control or pre-oxidation as recommended by the 2002 Treatability Study. Manual removal of zebra mussels is more economical than installation of chemical feed equipment considering the short term need.

2. Ozone

There are 2 ozone generators designed to provide adequate ozone for a WTP flow of up to 36 mgd. There are 3 ozone contact basins. The ozone generators were designed to produce 900 lbs/day at 10% concentration and up to 1300 lbs/day at 6% concentration each. Prior to recent repairs, readings indicated a production rate of approximately 700 lbs/day at 4% concentration. It is possible that before the recent improvements the ozone feed might not have been optimized. In fact, it is known that less than optimal ozonation previously led to increased chlorine feed which would have contributed to THM formation.

3. Rapid Mix

East and West rapid mix chambers allow chemical feed prior to the flocculation basins. Each rapid mix chamber is equipped with a 5 hp mixer.

4. Coagulation / Flocculation

The WTP contains two equally sized flocculation basins, east and west, and each basin provides tapered or gradually slowed mixing from inlet to outlet. There are fifteen 2 hp mixers for each basin with VFDs to control mixing speed. The 2002 Treatability Study recommended feeding both coagulation and flocculation polymer aids. Neither polymer aid is being used today because turbidity and TOC removals have been sufficient to meet regulatory requirements.

5. Settling

Primary clarification takes place within 3 basins containing plate settlers. The settlers are operating as designed.

6. Softening

Again, there are two basins for softening: east and west. Each basin is 120' in diameter and contains a solids contact softening unit. Each softening basin/unit has a design capacity of 18 mgd. The east clarifier has an effluent weir imbalance that the City intends to fix when low demands allow for construction. Low lift pumping limitations, flow control to the basins, control restrictions on residuals removal, and fluctuating demands have made it difficult for WTP staff to stabilize the softening process. Softening is accomplished by feeding lime. The decision was made by the City not to feed soda ash in order to remove non-carbonate hardness because acceptable hardness levels could be achieved with lime feed only and softening is short term until Lake Huron water becomes available. Lime and soda ash softening is a possible consideration to assist with TOC removal and thus reduce THM formation.

7. Recarbonation

Recarbonation for pH adjustment is accomplished in east and west recarbonation basins between and to the north of the softening basins. Carbon dioxide storage and feed equipment is located west of the recarbonation basins.

8. Filtration

Filtration is accomplished with 12 dual media filters, equally sized and designed to filter 3.0 mgd each. Media consists of 12" of sand and 18" of anthracite. The filters have been operated intermittently over the years due to the standby nature of the WTP and until recently, chlorine injection took place downstream of the filters. It is possible some microbial growth had developed in the filters leading to increased chlorine demand. The City recently hired a contractor to upgrade the electrical controls for the filters and that work has been completed.

9. Disinfection

Disinfection is provided by ozonation and by feeding chlorine. Ozonation occurs at the front end of the WTP. Chlorine is fed prior to filtration and prior to finish water storage / high service pumping. The intermediate chlorine injection location was recently constructed under the Phase II, Segment 1 contract.

10. Clear Well & Pumping

The pump building sits adjacent to a 3 MG clear well and contains both low and high service pumps.

B. JAR TESTS / EXPERIMENTS

1. Approach

There are several well practiced methods by which DBPs can be reduced. First, the disinfectant can be changed to an alternate that has a lower tendency to form DBPs. Second, additional treatment systems such as activated carbon or air stripping (depending on the nature of the precursors) can be added to remove DBP precursors. Lastly, the existing treatment processes can be optimized to remove as much DBP precursor as possible. Of these options, optimizing existing treatment processes is the only strategy that does not require the construction of new and expensive facilities. It is anticipated that Flint will be receiving Lake Huron water in approximately two years and this water will have a completely different chemistry from the Flint River. Major process changes instituted to address THM levels using Flint River water are likely to be unnecessary for Lake Huron water and may even be inappropriate. Therefore, those options which require addition of new treatment processes are undesirable at this time. In recognition of this upcoming change in water source, efforts for this study have concentrated on improving the existing processes, rather than adding new ones. New treatment processes will only be recommended if operational changes to the existing treatment train prove ineffective.

Recent sample test results suggest that most of the DBPs are formed in the distribution system rather than within the treatment plant. Therefore, the most logical approach is to reduce the DBP formation potential (DBPFP) rather than simply lowering the levels of DBPs leaving the plant. During bench scale testing, formation potential (FP) levels were the primary indicator of success or failure of proposed process modifications.

2. Protocol

Bench scale pilot testing is intended to reflect actual plant operating and hydraulic conditions so the bench scale treatment units were sized based on various dimensionless factors to ensure the pilot treatment matched the actual system. Bench

scale ozonation was not practical due to time and cost limitations. Therefore, water samples were withdrawn from the plant ozone basin effluent. These samples were transported to the laboratory and dispensed into square testing jars. The jars were used to simulate rapid mix, three-stage flocculation, and settling. Rapid mix and flocculation conditions were matched to the plant based on "Gt" values. The "G" value is a measure of the mixing intensity and is a function of mix time, viscosity of the liquid, and mixing power applied to the water. "Gt" then, is a size scaling factor where time has been accounted for. Settling time was scaled to match the shorter settling depth of the testing jars. After settling, samples were decanted from the test jars. The decanted samples were then lime softened; softening conditions were similarly matched on the basis of "Gt". Carbon dioxide was sparged into the samples to reduce the pH. The water was then vacuum filtered through filter paper, sized to simulate the plant's dual media filters. The samples were dosed with excess chlorine and allowed to react for seven days at 25° C before testing for DBPs to determine the formation potential.

The following conditions were applied during testing to properly match small scale testing to actual plant processes.

TABLE 6 – BENCH SCALE TEST MIXING INTENSITIES

Process	G	Duration	Mix RPM
Ozonation	Plant	-	-
Rapid Mix	200	44 sec	160
Flocculation, Stage 1	50	9 min	55
Flocculation, Stage 1	25	9 min	30
Flocculation, Stage 1	12	9 min	19
Settling	N/A	10 min	-
Softening	TBD	10 min	-
Recarbonation	N/A	N/A	-

The primary variables during testing were chemical additions and chemical dosages. Specific chemicals and dosages used for initial testing conditions were selected to reflect current plant usage and the recommendations of the 2002 Treatability Study:

TABLE 7 – BENCH SCALE TEST CHEMICAL FEED RATES

Chemical	Current Usage	2002 Study	Test Values
Ozonation	4.66 mg/l	1.5 mg/l	
Ferric Chloride	7.7 mg/l Fe3+	40 mg/l Fe3+	7.7 – 80 mg/l Fe3+
Coagulant Aid Polymer	Not used	2.0 mg/l	1 – 2 mg/l
Flocculation Aid Polymer	Not used	0.05 mg/l	0 – 0.05 mg/l
Powdered Acuvated Carbon	Not used	N/A	20 – 100 mg/l
Lime	120 mg/l	175 mg/l	120 – 175 mg/l
Soda Ash	Not used	52 mg/l	0 – 52 mg/l
Cationic Softening Polymer	3.13 mg/l	Not used	3.13 mg/l
Anionic Softening Polymer	0.88 mg/l	Not used	0.88 mg/l
Fluoride	0.45 mg/l	1 mg/l	Not used
Carbon Dioxide	32 mg/l	37 mg/l	Fed to reach pH of 7.5 +- 0.3
Chlorine	6.3 mg/l	3 mg/l	10 mg/l

3. Considerations

The 2002 Treatability Study did not note significant formation of DBPs. This may be a function of different Flint River water chemistry at that time. However, recognizing the considerable differences in chemical usage and dosages between that study and current operations, those differences in chemical use and dosage are an obvious starting point for optimizing treatment to prevent DBP limit exceedance.

Although it is believed that optimization of current treatment can correct the DBP issue, should optimization of present treatment prove insufficient, alternate residual disinfectants (chloramines and chlorine dioxide) will be investigated as additional treatment measures.

4. LAN Test Results

Two rounds of jar testing were completed by LAN during the weeks of December 15, 2014 and January 26, 2015.Detailed test data is included in Appendix A. Testing results can be summarized as follows:

- Increased dosages of ferric chloride resulted in higher reduction of THMFP.
- The currently utilized feed rate of lime at 120 mg/l is appropriate
- Softening with soda ash in addition to lime resulted in minor additional THMFP reduction – in the range of 0% - 10%.
- The benefits of using a cationic polymer during softening at a dosage range of 0.31 - 3.13 mg/l to help reduce THM's are unclear
- The benefits of using an anionic polymer during softening at a dosage range of 0.09 – 0.88 mg/l to help reduce THM's are unclear
- Feeding PAC was ineffective in reducing THMFP within the dosage range of 20 – 100 mg/l.

5. Testing by Others

In addition to jar testing completed by LAN, the chemical supplier who provides ferric chloride for the City, PVS Technologies, ran tests using their recommended flocculant polymer aid. Plus, Veolia Water completed jars testing of their own the week of February 16th to analyze other process details and current WTP parameters. Experiments completed by PVS Technologies showed very little TOC removal beyond that obtained with straight ferric chloride feed.

6. Conclusions

Increasing the dose rate of ferric chloride is an operational change that can easily be implemented without the need for any additional equipment. Test results show that over 40% THMFP removal can be obtained with a dosage of 60 mg/l Fe3+ or higher. Increased dosing of ferric chloride would be most ideal coupled with regular raw water TOC monitoring so that TOC levels would dictate the appropriate ferric chloride feed rate.

Softening with soda ash in addition to lime is another option the City should consider if increased ferric chloride doses are not adequate to maintain THM levels under the MCL, particularly during warmer months. Again, monitoring of TOC in the raw water could provide useful information of when lime/soda ash softening is necessary.

IV. DISTRIBUTION SYSTEM EVALUATION

EPA guidance for the distribution evaluation portion of an OER is focused on identification and isolation of a specific portion of the distribution system that led to the exceedance. The circumstances of Flint's apparent pending TTHM exceedances are unusual in that a new supply has been implemented which clearly corresponds to the high TTHM sample results. Although the new source is one element in increased TTHM levels, value remains in evaluating the distribution system since water age is also a critical factor. Additionally, there may be distribution improvements that can be made to help alleviate the problem.

A. INFRASTRUCTURE

1. Piping

According to the most recent MDEQ Sanitary Survey, the distribution system is estimated to contain 70% cast iron, 20% ductile iron, 2% concrete and 8% steel water mains. Unlined cast iron pipe can become pitted, allowing colonization sites for microorganisms leading to chlorine demand. Additionally, much of the piping in the system is aged and in poor condition. Increased chlorine demand could be resulting from biofilm in older pipes and from main breaks/repairs. The extent of contribution is not known but any water main replacement project will decrease chlorine demand somewhat if constructed properly. Unfortunately, water main breaks may also assist with decreasing water age by providing unintentional flushing. All things considered, it is impossible to quantify the impact existing piping has on THM formation.

The City utilizes City Point software and GPS equipment to document main breaks and prioritize replacements. However, main break information is more pertinent to rusty water complaints and has little relevance to THM levels. Areas that have been targeted for main replacements include the transmission main from the WTP west to Dupont and south to the West Side reservoir, Fenton Road, Atherton Road, Dort Highway, Averil Street, and Boulevard Drive.

2. Storage

There are 4 finish water storage tanks and 1 raw water tank as tabulated below:

TABLE 8 – STORAGE TANKS

Name	Type	Water	Volume (MG)	Operating		Absolute	
				LWL	HWL	Bottom	OF
Dort Reservoir	Ground	Raw	20	-	-	730	750
WTP Tank	Elevated	Finished	2	883.0	896.0	863.0	898.0
WTP Clear Well – PS #4	Ground	Finished	3	11'	15'	708.5	726.0
Cedar Street Reservoir	Ground	Finished	20	-	11'	737.2	757.2
Westside Reservoir	Ground	Finished	12	-	12'	761.8	779.0

The MDEQ typically recommends providing a minimum finish water storage volume of 1/3 the maximum daily demand (MDD). According to the 2013 MDEQ Sanitary Survey, the 5 and 10 year MDDs are 21.57 mgd and 30.05 mgd respectively. A common rule of thumb for clear well storage volume at a WTP is 10% of the design flow rate. Another general guideline for reliability is to provide total storage to allow for 2 X the average daily demand plus fire flow demand. For this analysis, fire flow is assumed to be 2,500 gpm for either one industrial fire (2,500 gpm) or a combination of one residential (1,000 gpm) and one commercial (1,500 gpm) fire at a 4 hour duration which results in a total volume of 600,000 gallons. These go-by

approximations are summarized below with the applicable flow rates and are compared to the existing storage volumes currently being utilized.

Common Practice	Flow Rate	Recommended Volume by ROT	Volume In Use
Clear well 10% of Design Flow	18 MGD	1.8 MG	3.0 MG
Finish Storage = 1/3 MDD	30.05 MGD	10.0 MG	37 MG
Total Storage = 2 * ADD + FFD	13.87 MGD	28.3 MG	57 MG

Based on the values above, it appears the storage volume used in the Flint system could be decreased without negatively effecting reliability. The appropriate volumes of individual tanks will be further evaluated using the water system model and discussed in Section V (C).

All reservoirs have baffling to minimize stagnant water. Also, all tanks have been maintained and are in reasonable condition. The Westside reservoir has an exposed roof that is in need of rehabilitation, but its current condition has no influence on THM formation.

3. Pump Stations

All pump stations are in good condition but pumps are generally oversized. As an independent consideration, oversized pumps are not a contributing factor to high THM levels. Control of pumps and pressure zones are discussed in detail below.

B. OPERATIONS AND MAINTENANCE

1. Pump Station & Storage Operations

Pump stations and storage tank levels are controlled as shown in Table 9.

TABLE 9 – PUMP STATION CONTROLS

PS Name	Control Point	On Point	Off Point
PS No. 4 Raw	Operator	-	-
PS No. 4 Finish	Match plant flow	-	-
Westside	System pressure (elevated tank)	22.5'	33'
Cedar Street	System pressure (elevated tank)	22.5'	33'
Torrey Road	Distr. – Brown/Bradley	< 45 psi	≥ 45 psi

Cedar Street and Westside pump stations are operated as needed and they are alternated. Typically, Cedar Street is run in the morning and Westside is run in the evening and reservoirs for each are filled during low demand periods at night.

Westside, Cedar Street and Torrey Road pump stations are used to boost system pressure when high demands warrant it, but there are not well defined pressure zones within the system. Therefore, the possibility exists that water is being recirculated allowing for increased water age.

2. Booster Disinfection Practices

Booster disinfection is provided at the Cedar Street and Westside pump stations. When sustained residuals are not provided by chlorine feed at the WTP, sodium hypochlorite is applied at the reservoirs while being filled.

3. Changes in System Demands

Water demands in the City have been declining since the 1960's as the population has dropped. As a result, many of the water system components are oversized including storage tanks and water mains which both increase the time for water to reach the user.

From a short term perspective, Flint demands tend to increase in summer as is ordinarily expected but also in the winter due to water main breaks. The MDD for Flint often occurs in winter. Regarding THM formation, with lower temperatures and higher flows in the winter, THM levels taken at the distribution sample points are expected to be lower than at other times of the year.

C. WATER SYSTEM HYDRAULIC MODELING

As part of this report, the City provided a hydraulic water model, originally developed by Potter Consulting, for LAN to update. Thus far, LAN has modified the model to be capable of extended period simulations, modified controls to reflect current operations, revised the piping to include known broken valve locations, and developed preliminary water age results throughout the entire system. Water age shown in the updated model corresponds well to TTHM levels at 6 of the 8 sampling sites. However, LAN has also identified several deficiencies within the model that require further adjustments to allow for usable and reliable results. Those model deficiencies include outdated demands, improperly located appurtenances, and incorrect flow patterns. Preliminary water age results are presented in Table 10. Revised results will be provided when the hydraulic model has been fully updated.

Fine tuning model

TABLE 10 – PRELIMINARY WATER AGE FROM WATER MODEL

Sample Point	Location	Address	Water Age (Hrs)	Aug 2014 THM (ug/l)
1	McDonalds	3719 Davison	23	145
2	BP Gas Station	822 S. Dort Hwy	18	112
3	Liquor Palace	3302 S. Dort Hwy	15	127
4	Taco Bell	3606 Corunna	128	181
5	Univ. Market	2501 Flushing	178	196
6	Salem Housing	3216 MLK	58	112
7	Rite Aid	5018 Clio	78	144
8	N. Flint Auto	6204 N. Saginaw	71	118

It is anticipated that topics shown below in italicized font will be detailed after the model is updated in March 2015.

1. Simulation of Existing System

Match existing conditions. Chlorine and THM data may be used to verify model results. We have chlorine feed data at plant and residuals at 10 locations in each MOR, May 2014 – January 2015.

2. Identification of Water System Deficiencies

Specific issues to look at:

- *Worst case at minimum daily demands*
- *Water age in entire system*
- *Recirculating water through pump stations*
- *Use of storage tanks – volumes in particular*
- *Indications of broken valves*
- *Effectiveness of booster disinfection*

Study of worst case hour min MDD vs. 16?

V. RECOMMENDATIONS TO MINIMIZE FUTURE OEL EXCEEDANCES

A. SOURCE

The City of Flint has already committed to the change from the Flint River as the water source to Lake Huron under the KWA system, planned for late 2016. The risk of future TTHM limit violations will decline substantially with the use of water from Lake Huron due to much lower DBP precursors. It is important to recognize that the Flint River will become strictly an emergency supply when the KWA supply becomes available and any investments toward the Flint River should be contemplated accordingly. Recommendations discussed below in this section apply to the Flint River as the source.

Reverting to supply from the DWSD until the KWA supply is available as an option. However, based on information provided by the City of Flint, the annual cost to receive water from the DWSD would be at least $16,000,000/year or $1,333,000/month. Therefore, utilizing the DWSD for interim supply is cost prohibitive under the terms defined by the DWSD.

1. Watershed Management

A volunteer group entitled the Watershed Coalition performs various tasks related to managing the Flint River watershed such as spring cleanups and annual benthic studies to evaluate the river 'health'. No additional action is recommended at this time.

2. Monitoring

The City documents daily raw water flow, pH, alkalinity, carbonate and non-carbonate hardness, chloride, temperature, turbidity and coliform count as part of standard preparation of Monthly Operating Reports (MOR). It is recommended to add raw water TOC and plant tap THM values to daily documented measurements which would provide staff the data needed to establish correlations to predict distribution system THM formation.

3. Intake Operations

The 2002 Treatability Study recommended pre-oxidation in the form of sodium permanganate as a feed at the intake. It is possible the addition of a pre-oxidant such as hydrogen peroxide or some type of permanganate could enhance the ozone process. Veolia evaluated permanganate demand during jar testing the week of February 16th, 2014 and further recommendations will be incorporated when results become available.

4. Seasonal Strategies

Past data indicates the Flint River is influenced by groundwater and in particular, dolomitic spring water. The result is hard water with high concentrations of magnesium and sulfate. Also, hardness and alkalinity are higher during the winter. Upon initiation of supply from the Flint River, the City made the decision to soften with just lime to focus on removal of carbonate hardness. One potential modification that could assist with TOC removal and thus decrease THMFP would be lime and soda ash softening. A temporary caustic soda feed system is recommended to be put in place in case the need for optimized softening arises.

5. Upstream Contamination Issues

Upstream contamination issues are extremely difficult to prevent and even if detected are difficult to locate. Evaluation of raw water data collected for MORs is the easiest

manner in which to detect upstream contamination issues because the data is already collected for treatment purposes. In fact, high total Coliform readings signaled a potential issue recently that the City identified and removed.

An upstream monitoring and warning system could be established to attempt to detect water quality issues or spill event type contamination early enough to adjust treatment procedures or cease intake prior to the contamination reaching the WTP. However, given the imminent conversion to the KWA supply, the period of full time use would likely be far too short to achieve payback on the capital expenditures.

B. TREATMENT PROCESS

1. Operational Recommendations

- Increase ferric chloride dosage: Previous testing in the 2002 Treatability Study, jar testing completed by LAN, and a review of 2014 ferric chloride dosages compared to THM levels leaving the WTP support that increasing the ferric chloride dosage would help reduce THM formation.
- Increased monitoring: Currently, the MDEQ does not require daily reporting of raw water TOC or finished water TTHM levels. However, daily tracking of such levels would allow the City to develop a correlation between the two, thus providing a predictive tool to help manage TTHM levels.
- Coagulation and flocculation polymer aids: The 2002 Treatability Study suggested the use of coagulation and flocculation polymer aids. These polymer aids were shown in the 2002 Treatability Study to increase TOC removal and thereby reduce THMFP. Further evaluation will be completed during jar testing.
- Discontinue softening bypass: The City was previously bypassing a portion of flow around the softening basins because hardness levels did not warrant softening of the full stream. However, this practice was discontinued because it was believed the bypass stream was contributing to chlorine demand and preliminary data has supported that belief. Chlorine demand dropped 0.5 – 1.0 mg/l following elimination of the bypass stream in early November 2014.
- Soften with lime and soda ash: Research has shown that enhanced softening with both lime and soda ash may provide additional TOC removal. The efficacy of this option will be evaluated during jar testing.
- Disinfection of filter beds: In case there has been microbial growth it is recommended the filters be 'shock' treated with chlorine and rinsed. A chlorine injection point was added upstream of the filters during the first segment of Phase II so future growth in the filters should not be an issue.
- Optimization of all existing treatment processes: Depending on bench scale testing conditions and results, slight modifications to all treatment processes might in order to replicate lower DPBFP.
- Discontinue or adjust softening anionic polymer feed: Some anionic polymers have been found to increase TOC. Veolia evaluated the anionic polymer currently being fed during their jar testing and depending on the results, when available, the softening anionic polymer feed should be adjusted accordingly.

2. Infrastructure Change Recommendations

- Fix and/or replace faulty ozone equipment: Since the ozone equipment was installed it has not been used extensively so the hope is that major components remain in good condition and the system can be easily modified to restore proper functionality. The City has scheduled the equipment manufacturer to field inspect the system on December 15, 2014.
- Replace filter media with GAC media: GAC media could help reduce THM levels by reducing both TOC and chlorine demand. For this consideration, the recommended approach would be to first complete small scale testing to verify efficacy. Upon positive results, the next step would be replacement of media in a fraction of the filters following by sampling to measure water quality. Those results would determine the need to replace media in additional filters.
- Change disinfectant to chloramine or chlorine dioxide: If other options prove to be ineffective, conversion to another disinfectant should be fully evaluated. Various characteristics of chloramination indicate an advantage over chlorine dioxide, but a full analysis would provide clarity as to which would be preferred.
- Install pre-oxidant chemical feed: Hydrogen peroxide or a form of permanganate as a pre-oxidant can enhance the activity of the ozone. Chemical feed could be installed at the intake structure or low service pump station, depending on the reaction time required. Use of a pre-oxidant at the intake might also provide the additional benefit of disinfection credit for ozonation with the MDEQ if an ozone residual can be obtained at the ozone process effluent as a result.
- Repair upstream sewer leak: a sewer leak upstream of the WTP intake was discovered and has already been repaired by the City.

C. DISTRIBUTION SYSTEM

Potential distribution issues related to water quality issues discussed in Section IV included old cast iron pipe, oversized infrastructure, and remote storage/pump station locations and operations that might be less than ideal. Recommendations to address those issues are offered in this section.

1. Manage Water Age

a) Storage Tanks

Considering the excess storage capacity discussed in Section IV, in the short term it is recommended that operational changes be implemented immediately to reduce the overall volume of water stored to decrease water age. Immediate operational recommendations include lowering high water levels of reservoirs other than the elevated tank, to reduce the total system wide usable storage volume to 30-36 MG.

In the long term, LAN recommends development of the most ideal options for water model evaluation. Excess storage volume and tank locations within the water system afford Flint numerous options to reduce the amount of storage volume utilized. As a starting point, two recommendations are presented below.

Option 1
- Take West Side reservoir and pump station out of service
- Cut storage volume used in half at Cedar Street reservoir
- Reduce the utilized storage volume of the WTP clearwell from 3 MG to 2 MG
- Adjusted system wide storage volume would be 34 MG

Option 2
- Take Cedar Street reservoir and pump station out of service
- Reduce the utilized storage volume of the WTP clearwell from 3 MG to 2 MG
- Adjusted system wide storage volume would be 36 MG

b) Residence Time in Pipes

Completely redesigning and replacing the water system to match today's demands is not feasible financially and would be a waste of infrastructure with remaining useful life. Going forward, it is recommended that any future main replacement projects be evaluated for possible downsizing. When the water model is fully updated, it will provide a valuable tool in determining which mains can be downsized and to what extent. Replacement of broken valves and valve exercising are also recommended, which are programs that have already been implemented into Flint's regular operations.

Operationally, hydrant flushing is recommended as needed to minimize water age in low flow areas. Again, the updated water model should be used to locate high water age areas and optimal flushing points.

2. Reduce Disinfectant Demand

Recommendations to reduce disinfectant demand are similar to those described above to reduce water age. Replacement of old cast iron pipes would lead to a reduction of disinfectant demand on the distribution side, but realistically can only be accomplished over a prolonged period of time. In the meantime, hydrant flushing is the most viable means of reducing disinfectant demand in piping. From a storage standpoint, all reservoirs and tanks should be regularly inspected and maintained to prevent entrance of any outside contamination that would contribute to disinfectant demand.

3. Water Modeling of Recommendations (yet to be completed)

Determine best flushing locations to reduce water age
Evaluate changes in storage tank operations to reduce water age
Valves to close/add to improve pressure zones, reduce recirculation
Optimization of pump station use – smaller pumps? Shut down?
Evaluate booster disinfection

D. BOOSTER DISINFECTION

Decreasing chlorine feed at the WTP and adding booster disinfection in the distribution system is an alternative intended to reduce the reaction time at higher concentrations of chlorine to reduce DPB formation. Extensive looping and branching within the existing system complicate how to best implement and utilize booster disinfection. Water system modeling is recommended to gage the effectiveness of existing feed point locations and dosages. Further discussion and details will be provided when the distribution evaluation results are available.

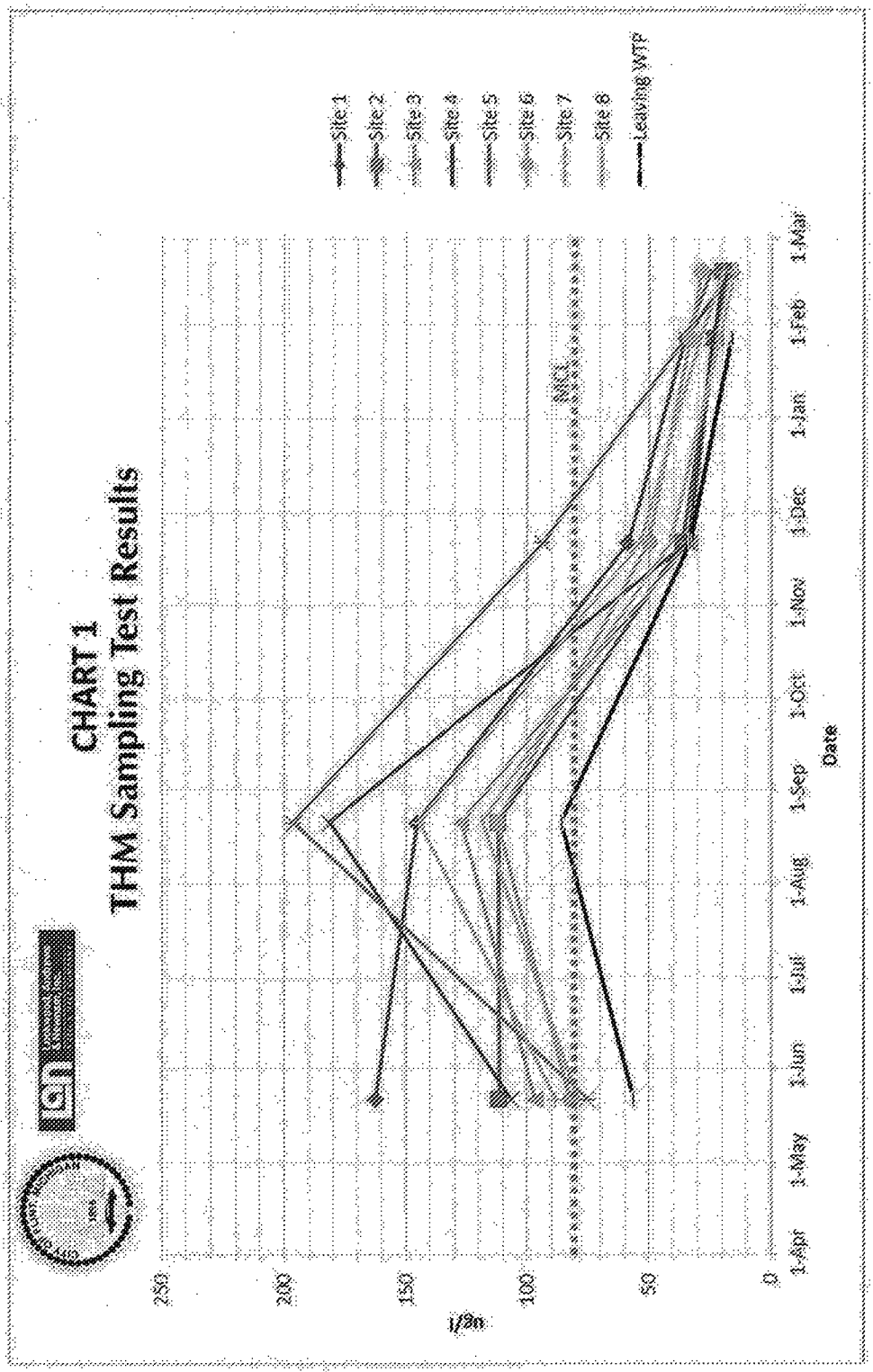
E. CATEGORIZATION OF ACTIONS

Considering that the Flint River is being used as the water source only until the KWA supply is available (expected late 2016), options to address high THM formation that require new construction or extensive time to implement are not preferred. On the other hand, the City understands THM sample results to date dictate that some action is necessary. Two categories have been developed to assist the City in prioritizing actions to take. Stage 1 consists of actions that can be completed relatively quickly without major construction and Stage 2 actions are either long term actions or solutions requiring major construction. Stage 1 actions are to be completed first followed by evaluation of the results prior to consideration of Stage 2 actions. Grouping of actions are shown in the table below.

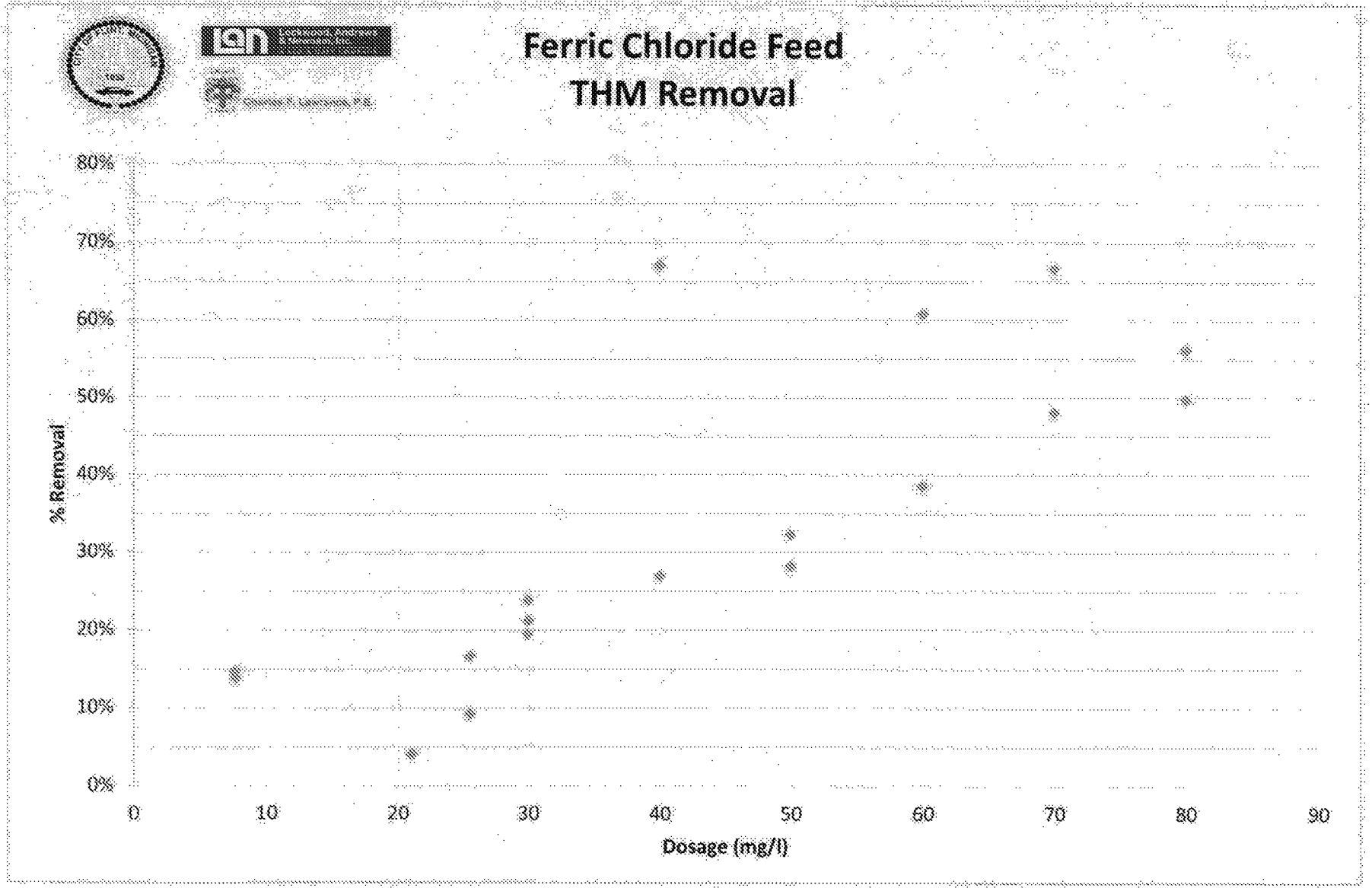
TABLE 11 – ACTION PLAN

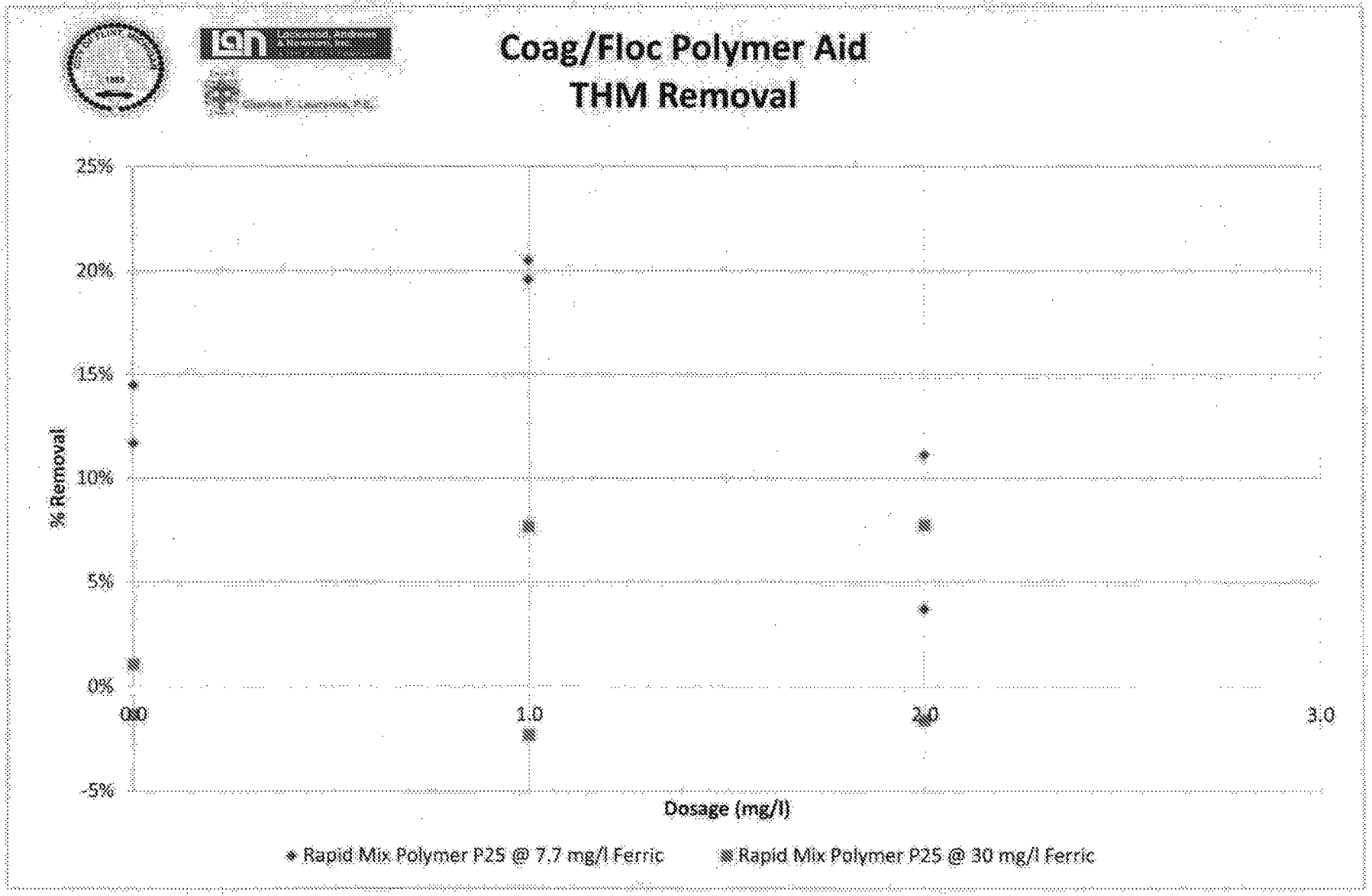
	Action	Purpose
Stage 1	Hire water consultant to complete 'water audit'	Third party review of actions and operations to make sure no options are being missed
	Increased water quality monitoring – obtain THM and TOC analyzers	Provide information needed to adjust WTP operations to match changing raw water quality
	Troubleshoot ozone feed system	Reduce chlorine feed and increase TOC removal
	Bench scale jar testing	Optimize treatment process and evaluate possible modifications
	Discontinue softening bypass	Reduce chlorine demand
	Disinfect filters	Reduce chlorine demand
	Increased water main flushing	Reduce water age / stagnant water
	Water system modeling evaluation	Determine areas with high water age and reasons
	Implement coag. & floc. polymer aids, if appropriate	Increase TOC removal
	Modify booster disinfection feeds, if appropriate	Decrease water age
Stage 2	Repair ozone system	Reduce chlorine feed and increase TOC removal
	Continue increased water main flushing	Reduce water age / stagnant water
	Convert to lime and soda ash softening	Increase TOC removal
	Continue valve replacements based on water model	Reduce water age / stagnant water
	Replace filter media with GAC	Reduce TOC and chlorine demand
	Change disinfectant to chlorine dioxide	Reduce THMFP
	Install pre-oxidant feed at intake	Optimize ozone disinfection, reduce chlorine
	Place priority on replacing cast iron water mains	Reduce chlorine demand

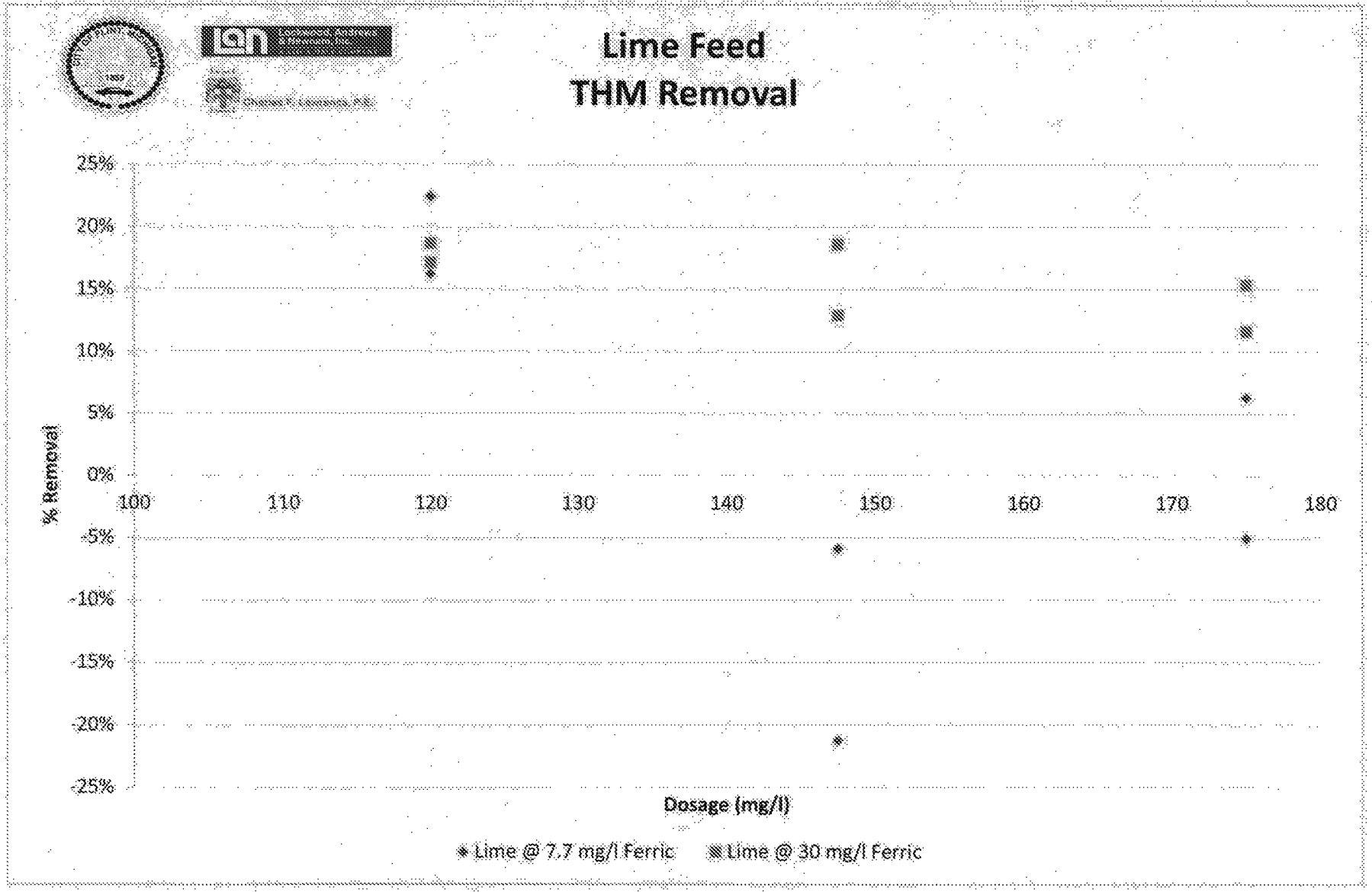
Samples were taken the week of February 16th for the 4th round of quarterly testing. The City has implemented many of the Stage 1 actions and THM test results have significantly improved (decreased) each time samples have been taken since August 2014. In addition to the regular compliance monitoring, the City performed a round of sampling on January 27, 2015. All sampling results are shown on Chart 1.

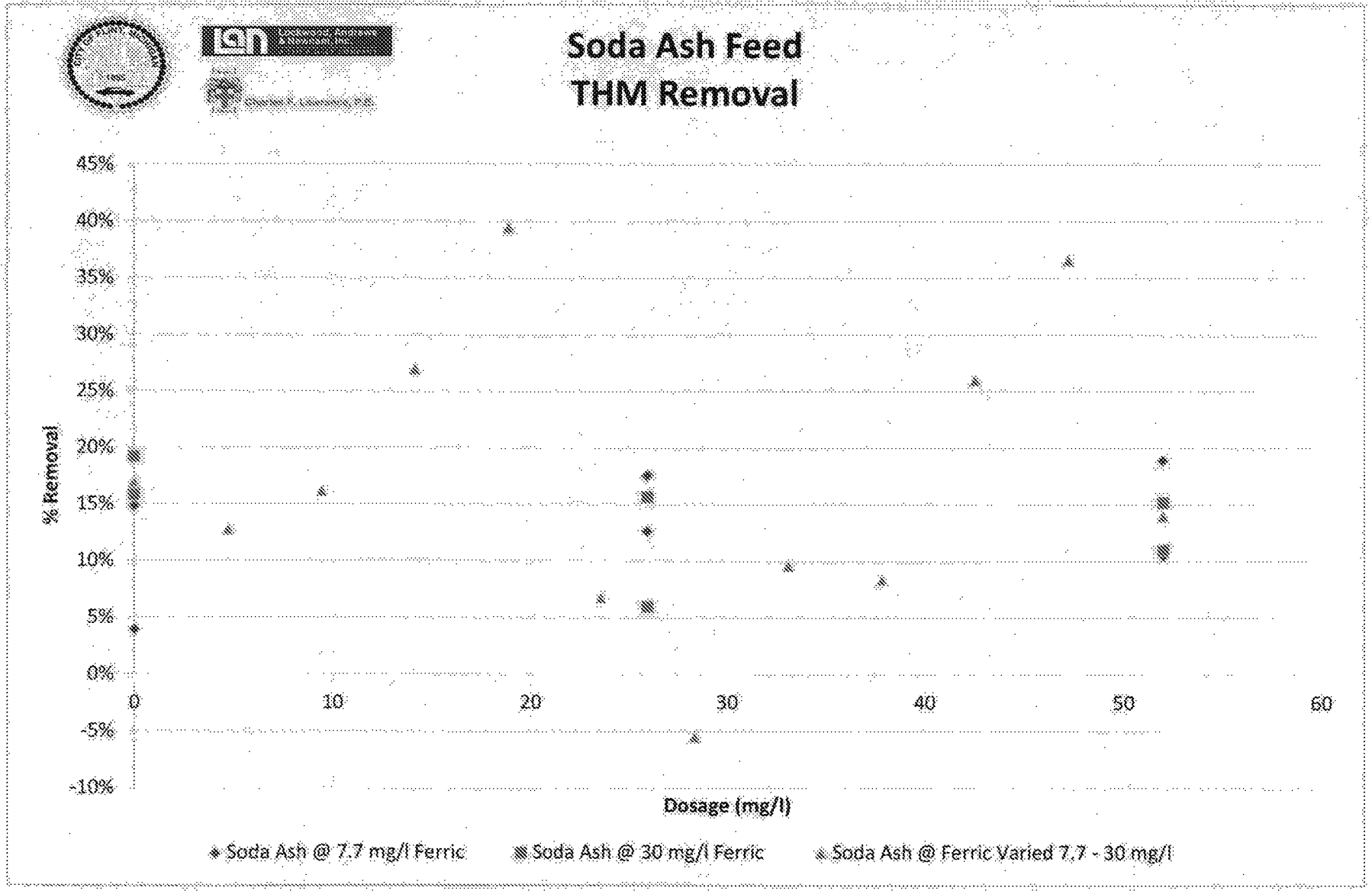

CHART 1
THM Sampling Test Results
ug/l
250
200
150
100
50
0
MCL
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
1-Jan
1-Feb
1-Mar
Date
Site 1
Site 2
Site 3
Site 4
Site 5
Site 6
Site 7
Site 8
Leaving WTP

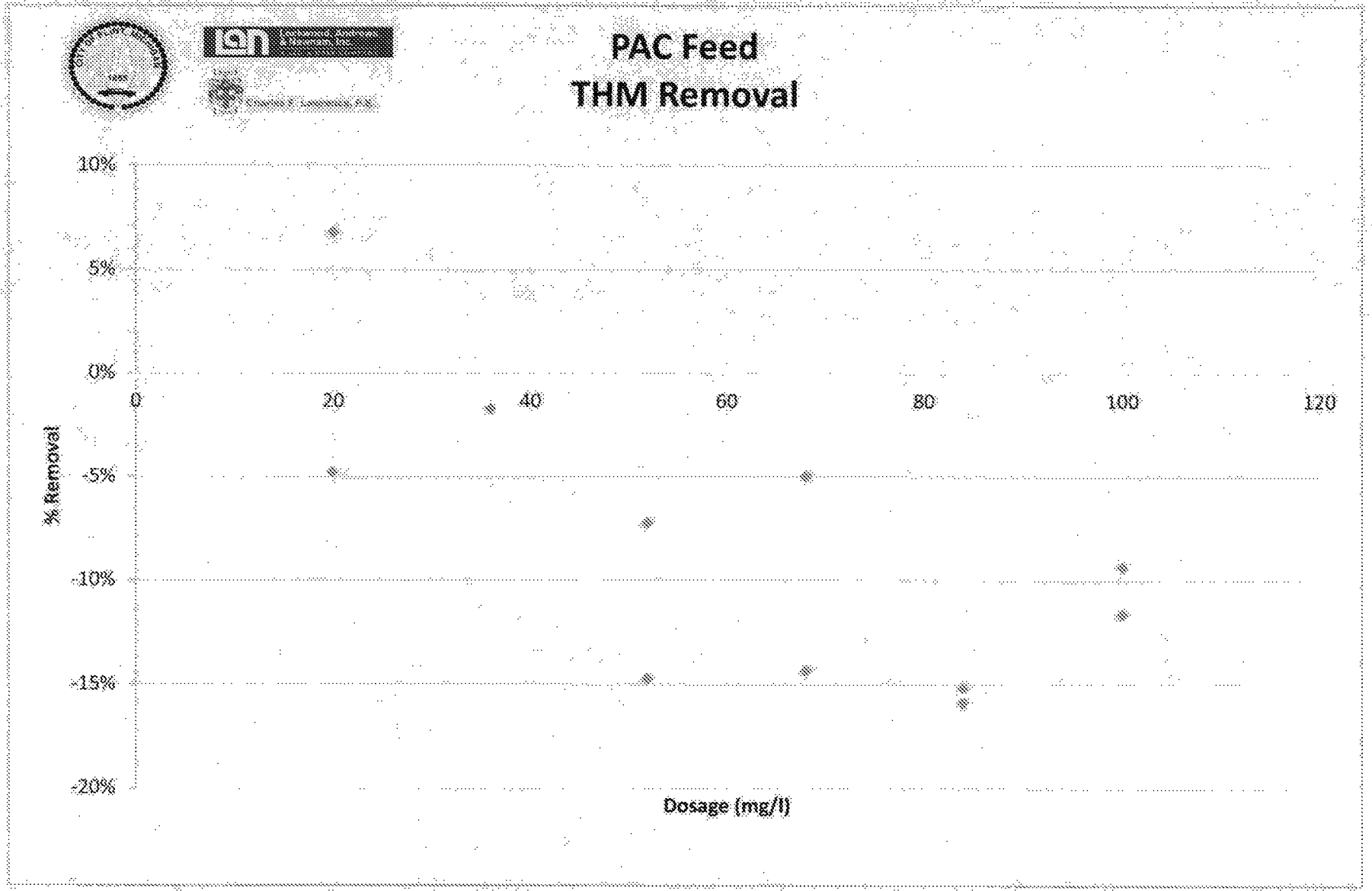
APPENDIX A
JAR TEST DATA


Ferric Chloride Feed
THM Removal
80%
70%
60%
50%
40%
30%
20%
10%
0%
% Removal
0
10
20
30
40
50
60
70
80
90
Dosage (mg/l)


Coag/Floc Polymer Aid
THM Removal
25%
20%
15%
10%
5%
0%
-5%
% Removal
0.0
1.0
2.0
3.0
Dosage (mg/l)
Rapid Mix Polymer P25 @ 7.7 mg/l Ferric
Rapid Mix Polymer P25 @ 30 mg/l Ferric


Lime Feed
THM Removal
25%
20%
15%
10%
5%
0%
-5%
-10%
-15%
-20%
-25%
% Removal
100
110
120
130
140
150
160
170
180
Dosage (mg/l)
Lime @ 7.7 mg/l Ferric
Lime @ 30 mg/l Ferric


Soda Ash Feed
THM Removal
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
-5%
-10%
% Removal
0
10
20
30
40
50
60
Dosage (mg/l)
Soda Ash @ 7.7 mg/l Ferric
Soda Ash @ 30 mg/l Ferric
Soda Ash @ Ferric Varied 7.7 - 30 mg/l


PAC Feed
THM Removal
10%
5%
0%
-5%
-10%
-15%
-20%
0
20
40
60
80
100
120
% Removal
Dosage (mg/l)

APPENDIX B
WTP DATA

TABLE 1 - SUMMARY OF NEGATIVE INFLUENCES ON THM COMPLIANCE SAMPLING										
FACTOR	2014								2015	
	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Softening bypass stream over 20% of plant flow										
Ozone system not feeding optimally										
Using full water storage capacity of WSR & CSR										
Chlorine feed at WTP 7.0 mg/l or more										
Ferric chloride feed rate less than 10 mg/l Fe^{3+}										
Raw water temp 23 degrees C or more										
Raw water TOC levels above 8.0 mg/l										
Raw water coliform over 5000 counts/day										
Positive bacteria test in dist. system (boil water notice)										
Water demand less than 15 mgd										

Dates of occurrence

Dates of occurrence and expected to repeat in future years

Compliance sampling date

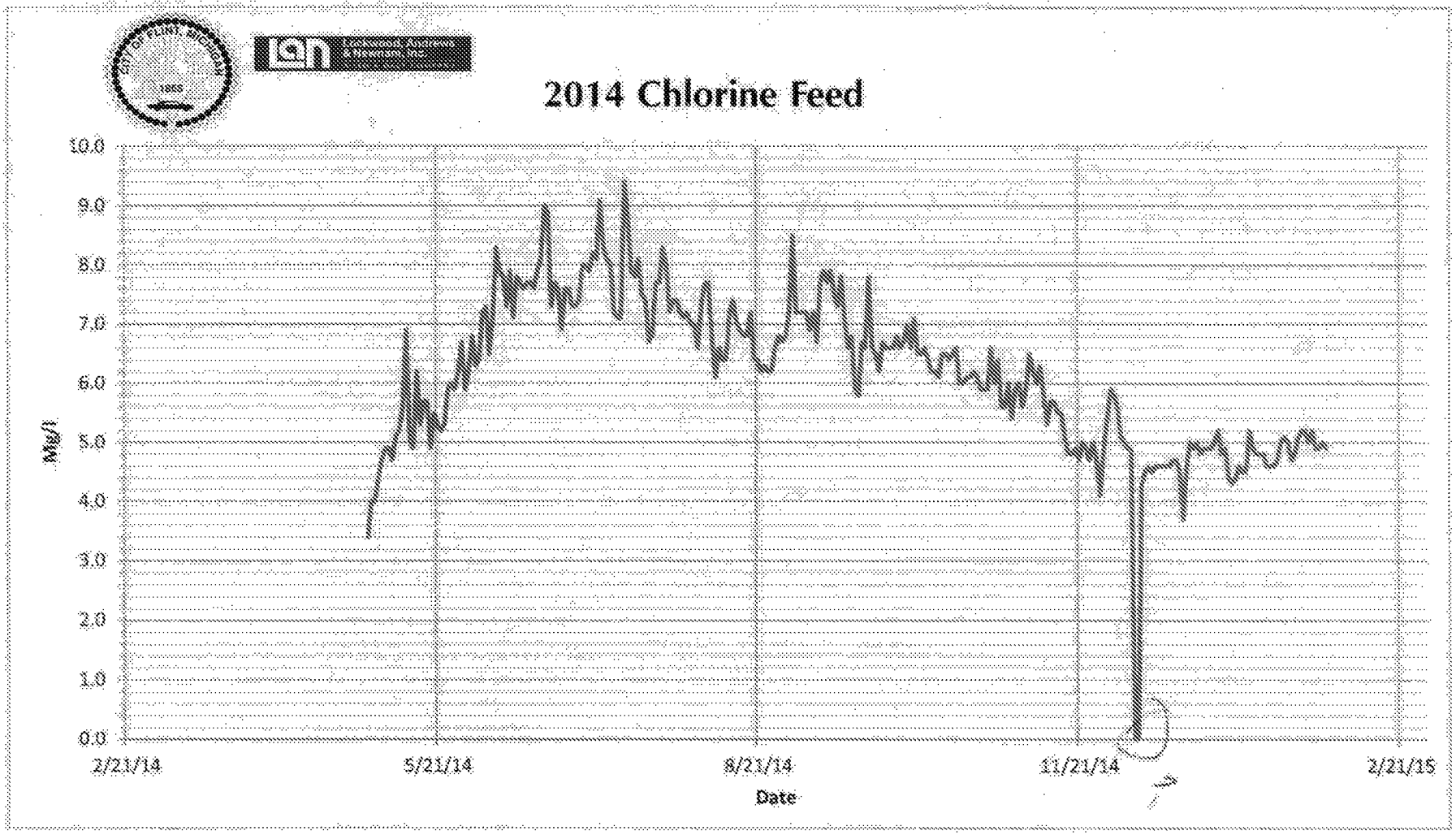
Factors under Flint staff control

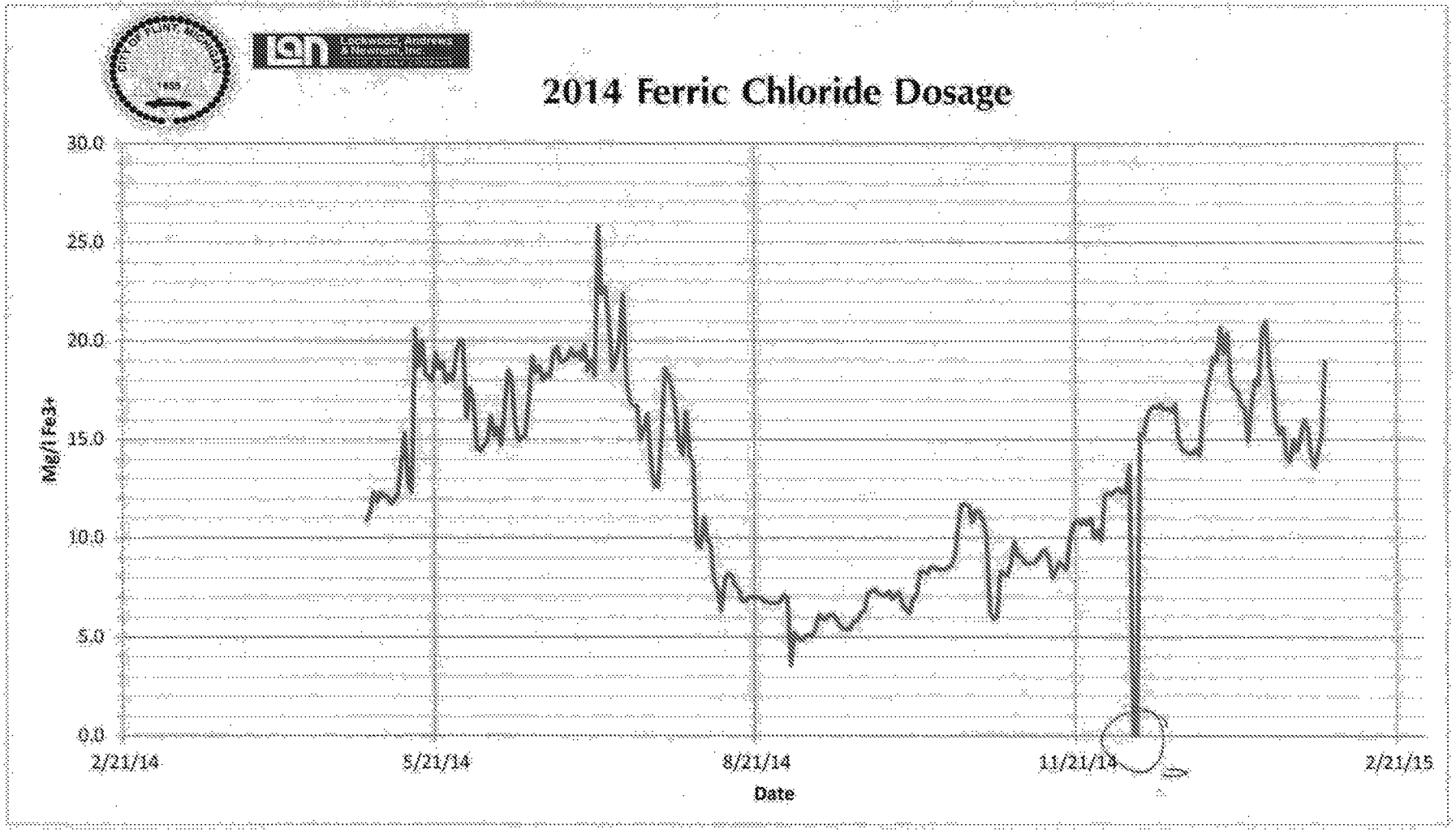
Flint River characteristics

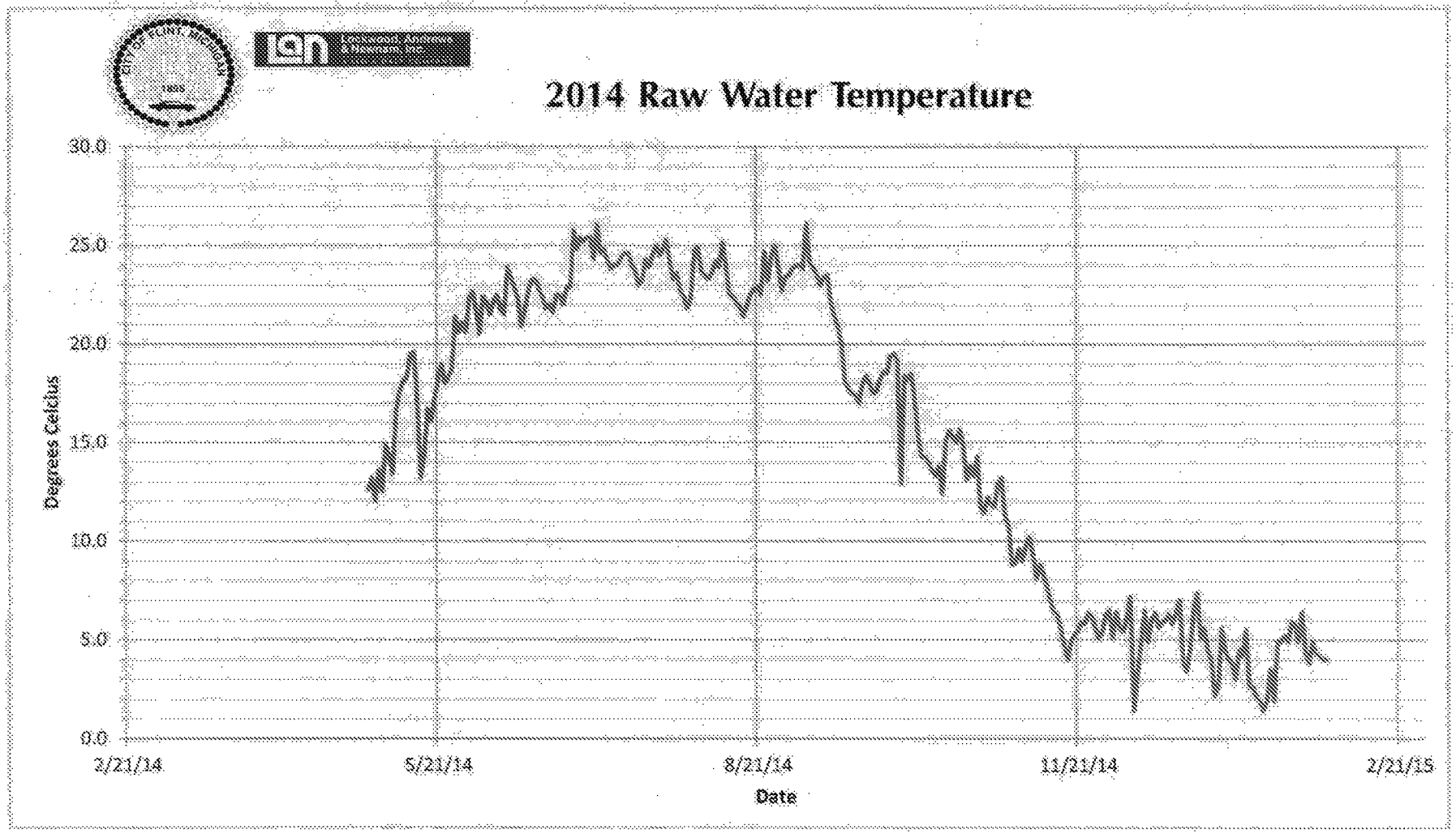
System factors

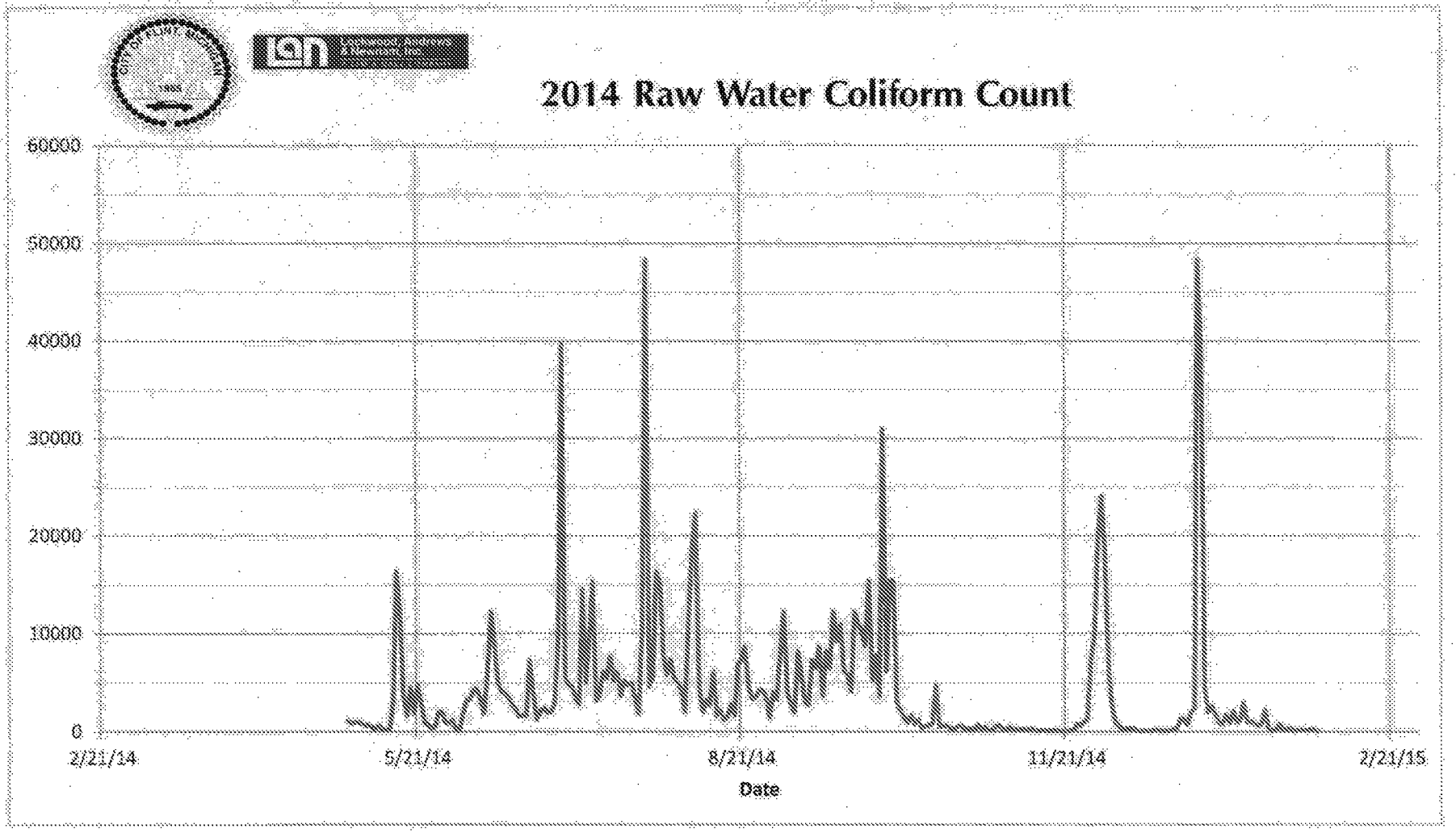
Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY

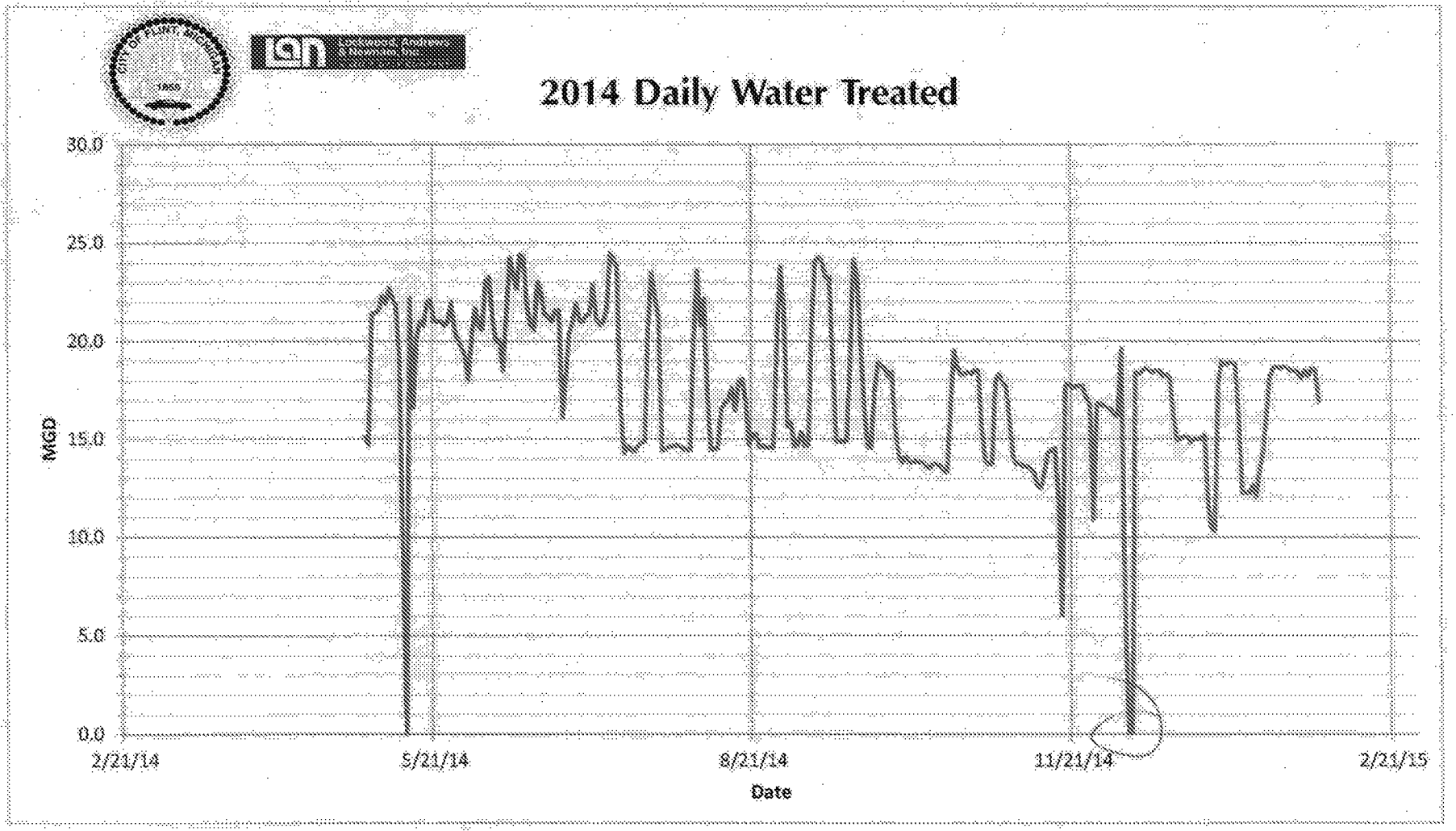
PLANNING
ENGINEERING
PROGRAM MANAGEMENT

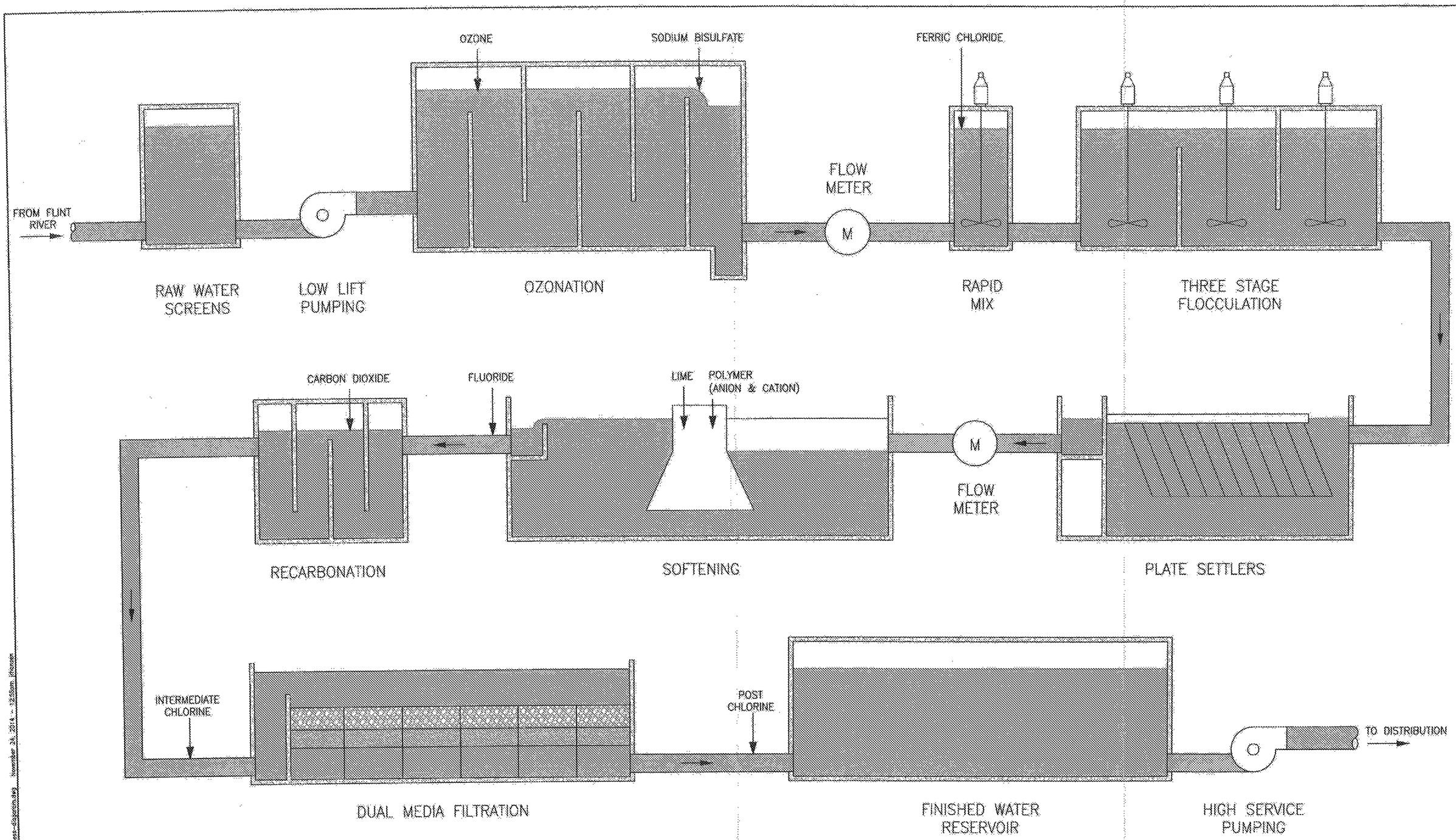

2014 Chlorine Feed
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Mg/l
2/21/14
5/21/14
8/21/14
11/21/14
2/21/15
Date


2014 Ferric Chloride Dosage
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Mg/l Fe3+
2/21/14
5/21/14
8/21/14
11/21/14
2/21/15
Date


2014 Raw Water Temperature
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Degrees Celcius
3/21/14
5/21/14
8/21/14
11/21/14
2/21/15
Date


2014 Raw Water Coliform Count
60000
50000
40000
30000
20000
10000
0
2/21/14
5/21/14
8/21/14
11/21/14
2/21/15
Date


2014 Daily Water Treated
30.0
25.0
20.0
15.0
10.0
5.0
0.0
MGD
2/21/14
5/21/14
8/21/14
11/21/14
2/21/15
Date



Genesee County

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
1311 S. Linden Road, Suite 8
Tel 810-820-2682 Fax 810-820-2703
www.lan-inc.com

CITY OF FLINT
WATER TREATMENT PLANT

REVISIONS			FILE LOG	
NO.	DESCRIPTION	DATE	ADDED	BY
			Manager	JWE
			Design	
			Drawn	JSH
			Check	JWA

WATER TREATMENT PLANT
PROCESS DIAGRAM

Project No. 130-10701-001
Date Nov. 21, 2014
Sheet
FIG 1

R:\100 Active\Compare 2013\

C:\projectwise\Thrasher\d0037969\Process diagram.dgn November 24, 2014 - 12:58pm jthrasher

Twb
Wtrm Ind
Cr

8 TOSD
30
35240
361FLM
04

3/4/15 Plant TAK Meeting

2 Committees formed

4 Technical Committee – REF
2 Community Committee

CIP – future cost each
WTP upgrades

Eng Consy – Sam R

Eng. Asst – short term / maintenance / long-term
to get permit for w/s/DEQ reqts

- Bray RD. (Lime Sludge)
- Electrod. technology / – sub str. fountains / New Feed
- M.d Pt Cl2
- B/Pass Conn/Raw water
- Nok Lok 30 dy/ storage
- Long Ass to most → 10-14 MGD - ADD

TMDL

Dist/Treatment Ass

121875

① TTHM UV ↑
O3 ↑
Color PR ↑ - 13x economic case to need MF if very costly comm.
Inorganics
TOC

GAC lifetime fnx of removal Cl2/Cl

- KMnO4 → UV abs vs. Dosage
use for sudden Δ in raw water Qual.

- O3 dosage ↑ Brom can ↑ Bromate
- Max O3 have @ 5 mg/l

- Ferric → 100 mg/l dosage gives best removal
at pH 7 C

- Lime Softening → optimal lime dose C 250 mg/l
can't get rid of Mg by overdosing as
lime — optimal appears 190 mg/l as CaCO3

only aware - hardness w skin irritations

- Map of water age
- Map of WM complaints
- website of WQ complaints
- Ctr Louisville plant - 10K employees in city
- Ctr Rushing Water Program - most/least MST

Other exposure routes for TTHM,
- inhalation ?
- absorption via skin ?

what is EQ bath cfg. to good ex. healthcare providers under-bar scenarios.

* Vs - no issue to CA / NOT 2 DRD work open for NOD Long. → what would DD recc for EQ long?

Further Dest. / hdth effects w/ Long for FAQs CCR

Skiffe ?s - not clearly rel. health conc.

MORE on Inc -
CCR
only UR in Vis. ? not toxic

Next Meeting Set FOR 6 April

Prysby, Mike (DEQ)

From:	Howard Croft <hcroft@cityofflint.com>
Sent:	Tuesday, May 19, 2015 9:40 AM
To:	Brent Wright; donna. cole; Elizabeth Murphy; gdn2@aol.com; Gerald Ambrose; Howard Croft; James Henry; Jason Lorenz; jmikewright; JoAnne Herman; John O'Brien; Kirk Smith; larry.koehler@mcc.edu; Laura Sullivan; Michael Glasgow; Michael Wright; Mike Lane; Prysby, Mike (DEQ); Norb Birchmeier; Pete Levine; Robert Bincsik; Robert Nicholas; rosejo@msu.edu; Russell Hudson; Samir Matta; Warren Green
Cc:	Dayne Walling; Natasha Henderson
Subject:	Technical Advisory Team Meeting _ May
Attachments:	2015-05-20 TAC Agenda.pdf

All,

I am sending everyone the TAC team agenda for Wednesday's meeting, there is room left for general conversation regarding next steps and future agenda's. We look forward to seeing everyone that can make it to City Hall tomorrow.

Thank you,

--
Howard Croft
Public Works Director
City of Flint
1101 S. Saginaw Street
Flint, MI 48502
PH# 810.766.7135 Ext.2043
hcroft@cityofflint.com

Flint Water
Technical Advisory Committee
May 20, 2015
Flint City Hall

Agenda

2:00 pm	**Welcome** **Purpose of the Technical Advisory Committee: Provide a respectful means of sharing factual information and having dialogue around the City of Flint water.**
2:05 pm	**Introductions**
2:10pm	**Current water status information – M. Glasgow, Operator In Charge (F-1)**
2:20 pm	**Improvements Information – H. Croft, Director Department of Public Works** New filter media installation Leak detection New pipe installation Water meter installation New water page on City website
2:40 pm	**Discussion on next TTHM testing expectations**
2:50pm	**Discussion on current health concerns, including lead and copper testing**
3:30pm	**Next Steps** Next meeting, one month or two months?
3:35 pm	**Adjourn**

Sources of Information:

City Website: CityofFlint.com See Residents: WATER or
Departments: Public Works: Utilities - many links to reports, Q&A and other useful information.

If you, or another Flint resident, would like to have their water tested: call 810-766-7135 ext 2606

5/29/15 TAC Mtg

MAX O_3 → 5 mg/l Annual Average 3 Yrs
PARTS → 150 mg/l Basis of TAC Rec.
CMO → 190 mg/l Basis

Appl Mar - Foam 165 mg/l Avg
O_3 24 mg/l Max
Lac 12 mg/l Avg

Gen Cm. mod Secty

→ Cooper FNT Hc-196 ORC ASSN
OR Michael W. 9T - EPA, CXN
- Mike G. Accepted Assistance of Duty
Natasha Henderson
Jim Henry
Larry Fuller North
McClure
Hurley
Warren Green
Kirksmith
H Enpt

Agenda

WTP Status Update

Gibson

- Hardnose 160 - 180 Some last fall
- River Hardnose 250 - 300
- Tox - Sawyer 5 - 10 RAM - Jerk Spring
- 2 - 3 PTAP

Okeechobee Tox weekly - 65% Rom
TTHM → 2 - 35 Loving WTP

Sanford

SAC

Calgon - Stopped installation June
Orange - 4 of the 8 done by Mid-July
or 4 - 6 wks prior to Aug sampling

Six sta locations - Clean / in GAC max
not to be used

MOEQ

11 tracks w MOEQ Rogers & Lu Contractor

Beyond GAC - WTP → Cox / Lu 36 days
Tanks in place / piping
* Lu-Colored support - baby to connect
* Send Sand/GAC to Calgon for column tests
Y/N testing on GAC → Longevity
Lab Selection - RFQ in place
4 week Assessment on River Front Main
Update to Mobile on June 10/14 weeks
Hyd model continues to evolve

24 Transmeon - bids higher than expected
Phase one - challenge
Water meter - long leads
16000 new meters next 2 years
- Outsite - water page UAT/QA
timeline
Review IT & give Hawell feedback
CCR Dec - talk the steps - Multiple meter
Located IN Petaed for local testing
MCC valves - TC, EC capability
Connectivity of public mobile & Secal media
£400,000 to make funded
H Croft - updated us RS Dec 2013 - WAM to see
- 5 YR CIP
Next meeting? - After GNC installed
Late July / E Aug
After E Aug begin looking @ new
FCa use / new egs

Last Meeting 3/31/15

3/31/15 WTP meeting notes

— attempt to make straight run

— stick along to interlock w. min leakage

(1) — Longevity of steel alley? Interim — fill as ok w/ concrete + len cap & seal
> solids work NEXT PLAN

(2) — if not ready to be handled away, then create berm

— use cachet

— excavate 1 time * pile (temp) on north end — take to landfill on ag-use

Phy sep: address city to remove both ponds
— cap in place / remove → will need to dispose (Dawn Rikerby) what makes it "in-cat"

interface w. DPW

Capacity on Lagoon ≥ 3-4 months without discharge of supernatant to San Sewer

2 plant applications to be here (submitted) for WTP / Bray Rd

ok working to
Start Solid waste Sampling by July 1
— due timeline for report (Acol) Oct 1st

UNTP OP

1- Δ source – mgn. Δs due to Δ source
+ op Monitoring

2. OP. oversight – 3 shifts planned

3 Project Schedule
Pump – data inst-QC
mid Nt – ready @ start-up
electrical – ready @ start-up
O2/NOx – storage ⟶ monitoring system to check on chem delivery & turn around time for delivery
plan sent ↑

Goal: start on 9/17

Start-up Goals – Goal to soft start
start-y on 9/17 or
as soon after as possible

* MFI to re-bid @ Re-submittals & input
any further clarifications – work to
* Sure CP & Add Bony Rd addendum to CP

No dates for Report &.

When WTP is ready to roll

Get final sets of plans to
CS for Review

→ set letter drafted

- A.R to do rate Mon. schedule
  or charts — strategy to use in Nov-Feb
  →
- Compl. of Permit for Op. det. I.
- Continue
  Budget (w. own) →
  - Acct work agreement
  - Fact units to
    - Draw water w. Penalty as non-compliance
    - Split Pro Capital
    - Gen. Co. Fac. US — In energy
    - Gen. Co. for Penalty → Final Pay. Gen Co.

Call to Gen Co.

Study Needs Continue

Prysby, Mike (DEQ)

From: Wurfel, Brad (DEQ)
Sent: Wednesday, April 23, 2014 5:34 PM
To: Busch, Stephen (DEQ)
Cc: Shekter Smith, Liane (DEQ); Benzie, Richard (DEQ); Prysby, Mike (DEQ)
Subject: Re: Flint

Thanks for the heads up, Steve!

Sent from my iPhone

On Apr 23, 2014, at 4:51 PM, "Busch, Stephen (DEQ)" <BUSCHS@michigan.gov> wrote:

> Brad there is a ceremony at Flint we are planning to attend on Friday mid day so we need to develop a statement for the press sounds like ABC news 12 will be at the ceremony at least
>
> Stephen Busch, P.E.
> Lansing and Jackson District Supervisor
> Office of Drinking Water and Municipal Assistance
> MDEQ
> 517-643-2314
>
> Sent from my iPhone
>
> On Apr 23, 2014, at 11:09 AM, "Busch, Stephen (DEQ)" <BUSCHS@michigan.gov> wrote:
>
> > Brad,
> >
> > Here are some talking points:
> >
> > - The City of Flint is going beyond minimum public health standard requirements to provide drinking water at a level of service meeting its customers' expectations (softening and ozone treatment to address taste and odor).
> >
> > - While the Department is satisfied with the City's ability to treat water from the Flint River, the Department looks forward to the long term solution of continued operation of the City of Flint WTP using water from the KWA as a more consistent and higher quality source water.
> >
> > - This is not a one time review. The Department will continue to oversee compliance by the City of Flint with all requirements under the Safe Drinking Water Act and monitor its operations in the same manner it does for the over 1400 community water systems throughout the State of Michigan.
> >
> > - We support the City's commitment to enhance capital improvement work within its water distribution system, and not just here at the water treatment plant.
> >
> > How is this for a start?

Brad wurfel (517) 284-6713 wurfelb@michigan

6/8/2011 WTP Visit & notes

City of Flint Water System Discussion
Water Treatment Plant/Water Distribution System
6/8/2011

WATER TREATMENT PLANT:

1. **Water Treatment Plant Test Runs - Test runs performed in 2010 - reports?**

3 in 2010 3 times in (II)

- Mike G will print these reports & make avail

No. of test runs with intermediate CL2?

3 times

looking to upgrade to perm de-CL system

2. **Emergency Response Plan/WTP SOP - status** - Still working on this

site ERP – updating this doc

ERP required in place of Contingency Plan

Potential pipeline problems in 2011 or beyond - still some leaks on Gen'l system w/ aff residual

M. Green wants quote from D. Austin for repair work

WTP SOP for test-run and emergency operation

→ separating for S-by/ test-op & emerg op.

& incl. liq chems

WATER DISTRIBUTION

3. **Reliability Study**

Signed to meet J. Markstrom results & for planning PS

Phase II Study – status? - also to done

Amended Phase I document – to be included with Phase II submittal?

Flint needs to make dec.
River → HAM DAM
Source H2O Protection

Global Items:

Karegnondi Water Authority/DWSD Second Pipeline

- **Future use level of Flint WTP**
- **Flint's capability to participate in Karegnondi** – Admin's split on this issue – town
- **Additional improvements at WTP**
- **New contract with DWSD** - No Consideration
- **Genesee County Relationship/Contract**

2011 Needs Survey - status of completing the 2011 survey?

→ only completed elevated tank

B Wright
M Brown
> are working on Survey

short For By end of June

Mayor Walling / Jeff Wright are working together in Mod. Clearwell

Short-term op/ – Not going to use Bad Bray Rd – Drying Bed

Capital improve – look in 12 to start clean-up of Bray Rd

Applying for DWRF on Torrey, Cedar, Westside.
+ the 24"-inch steel.

Flint Meeting 11/5/13

WTP Needs for Op.

1. Chem Sto. 30-day supply
2. Mid Pt Cl_2
3. Electrical Service
4. HS Pumping improvements
5. Lime Sludge Disposal options
6. Reliability Study – Completion of Phase 2 West-transmission piping

(248) 858-5055
Amwell@bhsh.com
Assoc.
– Lansing Sewer
– MGC

Prysby, Mike (DEQ)

From: Jeff Markstrom <JMarkstrom@rowepsc.com>
Sent: Thursday, October 25, 2012 7:22 AM
To: Prysby, Mike (DEQ)
Subject: Flint Water Reliability Study

Mike,

I just remembered that you left me a message a week ago. I'm sorry for not getting back in touch with you earlier. I'll try to answer your questions by this email.

<u>24-inch Water Main / Cedar Street / Torrey Road</u>
Even though the City backed away from the DWRF project this summer, they asked that we still get the projects completed and submitted to the MDEQ for permits just in case they decide to move forward with all or a portion of them on their own . The drawings that were submitted to you are the same projects that were previously in the DWRF package. I don't remember ever submitting final documents for the MDEQ to review and permit. If I am wrong, please let me know.

<u>Water Reliability Study</u>
I also thought that you referenced something about the Water Reliability Study in your voice mail to me. We (ROWE) completed both a Phase 1 and a Phase 2 component of this study. I believe that both the Phase 1 and Phase 2 studies had been previously submitted to you (MDEQ) for review and comment. When you referenced coming over and meeting with the City to review the Phase 2 were you just wanting an update on where they are with starting to work on the improvements that were identified? Please confirm.

If there is something else, please email or call my cell at 810-869-5398. Thanks

Jeff S. Markstrom, P.E., Project Manager
ROWE Professional Services Company

540 South Saginaw Street, Suite 200, P.O. Box 3749, Flint, MI 48502
tel: 810.341.7500 x202 / fax: 810.341.7579 / cell PPI
JMarkstrom@rowepsc.com / www.rowepsc.com

3/19/14
Consultant's Resp. to DEQ's comments on WTP upgrade

Flint WTP Improvements – Phase II, Segments I, II and III

Responses to MDEQ Review Comments dated 3/19/2014

Segment I – Initial Watermain Cut-in

1. Detail 2, Sheet C-504, "Air Release & Access Manhole," shows a 2" corp stop for air release. These are intended to be manual air release valves for exhausting air upon initial filling of the pipeline or after maintenance has been performed and refilling the pipeline. The manhole structure will be checked periodically and pumped out with a portable sump pump as part of the normal plant maintenance program.

Segment 1 – Rehabilitation

1. Raw Water Piping
   a. Maintain back up supply from Genesee County during interim operation at C.S. #2. Installation of the 42" raw water piping has been delayed until the KWA project is closer to being ready to supply water to the City. This will allow the City to maintain the backup supply from Genesee County during interim operation.
   b. The crossing of the new 42" steel pipe over the existing 54" concrete pipe is shown in plan on drawing sheet C5-101, with Detail 5, Sheet C5-501 showing how the 42-inch line will be supported. As shown on Detail 5, Sheet C5-501, the new 42-inch line will have concrete pipe cradles constructed on either side of the existing 54" pipe, maintaining a minimum clearance of 12" on either side of the 54" pipe. Pipe loads from the 42" line will then be transferred to the pipe cradles and into the soil, and not the 54" pipe. The 6" clearance between the two pipes will be backfilled with CLSM material as it will be impossible to compact typical granular bedding material under the 42" pipe.
   c. Detail 2, Sheet C5-505, "Air Release & Access Manhole," shows a 2" corp stop for air release. These are intended to be manual air release valves for exhausting air upon initial filling of the pipeline or after maintenance has been performed and refilling the pipeline. The manhole structure will be checked periodically and pumped out with a portable sump pump as part of the normal plant maintenance program.
   d. See attached color coded yard piping diagram.

2. Midpoint Chlorination
   a. Four (4) new scales will be provided for monitoring chlorine usage from ton containers. Scales shall be as manufactured by Scaletron Industries Ltd. with a load range of 0 to 4000 lbs.
   b. The City has not been able to determine that the chlorine scrubber is a requirement of any applicable code. At this time, the City will not be installing the chlorine scrubber shown on the design drawings and will rely on the existing ventilation system to exhaust air from the Chlorine Storage Room.
   c. The existing ventilation in the Chlorine Storage Room was tested to have a capacity of 18.3 air changes per hour, or 0.305 air changes per minute. Therefore, one room volume air

change would take approximately 3.3 minutes with the current ventilation system. See attached test results. Due to the size of the existing Chlorine Storage Room, a ventilation system of 1 air change per minute is not practical. While the existing ventilation system capacity is less than 1 air change per minute, it appears to be in compliance with 10 State Standards as lesser rates may be considered in cases where 1 air change per minute is not appropriate due to the size of the room.

d. WTP staff will identify and inspect all proposed and existing piping and conduit wall penetrations in the Chlorine Storage Room and seal as necessary to prevent gas leakage into other parts of Pump Station No. 4.
e. Existing floor drains in the Chlorine Storage Room were for condensate from the old chlorine evaporator system. These drains will no longer be used and will be plugged by WTP staff.
f. WTP staff will attach new door sweeps with better seals at existing doors as required.
g. WTP staff will extend existing ventilation intake ductwork to finished floor level with 90-degree bends.
h. Per Addendum No. 1, an Anti-siphon / Back Pressure Valve and additional ball valve shall be added just prior to the trough wall penetration. The anti-siphon / back pressure valve shall be PVC and designed for use with chlorine systems. The valve shall be a LMI #35856, Walchem E90422, or engineer approved equivalent. The valve shall be installed between the two ball valves to allow for isolation during servicing. The valve shall be located above the high water level in the trough. The Contractor shall install a 1" drain line from the relief port to the finished floor elevation of the pipe gallery.

3. High Service Pump
   a. The new 16" pump control ball valve for HSP #1 replaces the existing pump control ball valve in kind and will operate in the same manner as the existing valve. The valve will act like a check valve upon emergency shutdown of the pump through the use of a hydraulic cylinder actuator that will automatically close the valve. The cylinder actuator uses hydraulic water system pressure to supply the energy required to close the valve.
   b. The existing HSP #1 is rated for 25 MGD at 185' TDH. The proposed replacement HSP #1 is rated for 15 MGD at 185' TDH, matching the head condition of the existing pump.
   c. Results from the City's hydraulic model were used to develop system curves for max day and average day, which were used to confirm pump selection. The proposed HSP #1 will operate on a VFD which can be adjusted during operation to meet various duty points depending on demand.

4. LOX/LIN Storage
   a. Nitrogen usage is calculated based on 2.5 % of the oxygen usage:

      2,833 ppd O_2 x 0.025 = 71 ppd N_2

5. Electrical Improvements
   a. The operation of the pumps is contained within a single switchgear at Pump Station No. 4. However, there will be a dual feed coming into the main plant switchgear that will supply redundant power to the plant, including Pump Station No. 4. There will also be two breakers

at the main plant switchgear that feed two different breakers at Pump Station No. 4. Therefore, any one point of failure will not take the system down.

Flint WTP Improvements
Phase II
Segments I-III
MDEQ Comments
March 19 , 2014

Segment 1 - Cut –in Piping

The detail shows air-release manholes with corp. stops? How will the air release operation be executed? Means to drain the manhole?

Written response needed.....

Segment 1 – WTP Rehab

1. **Raw Water Piping – Maintain back-up supply from Gen Co. during interim operation at C.S. #2. Sheet C5-102**

   54X42 cross (Sheet C5-501 & C5-101) only 6-inches – Support?

   Air-release manhole – same as Cut-in piping

   Current yard piping diagram?

Written response needed on the first 3 items. Yard piping diagram will be a work in progress.

2. **Mid-Point CL2 - Basis of design provided**

   - **Scale – use existing or proposed? If poposed - type, capacity**
   - **Scrubber?**
   - **Room air-exchange rate ?**
   - **Pipe penetrations – discuss protective seal**
   - **Floor drains – discuss**
   - **Door sweep - discuss**
   - **Scrubber piping – lower intake**

- **Check valve/anti-siphon at influent channel - include in final**

3. **High Service Pump**

   Will mechanical ball valve operate like a check valve in event of unexpected pump shut-down?

   TDH of current pump and proposed pump?
   Conformance of proposed pump TDH with system head curve?

   Written response needed.....

4. **LOX/LN Storage**

   Piping configuration clarified
   The LN calculation (71 ppd) is not clear. Is there a % concentration or transfer efficiency?

5. **Electrical improvements**

   Are operation of the pumps being split with the MCC or are multiple MCCs being provided?

   Written response needed.....

3. High Service Pump

   Will mechanical ball valve operate like a check valve in event of unexpected pump shut-down?

   TDH of current pump and proposed pump?
   Conformance of proposed pump TDH with system head curve?

4. LOX/LN Storage

   LOX & LN piping clarification – Sheet D2-102 & D2-601
   BOD for storage
   Ozone was designed at 4.0 mg/l max dose @ 36 MGD (Sec. 3.5 WTP BOD)

   Ozone max dose at 18.0 MGD is 650 Lbs/day

   How many GPD does this equate to?

5. Electrical improvements

   Are operation of the pumps being split with the MCC or are multiple MCCs being provided?

Flint WTP Improvements
Phase II
Segments I-III
MDEQ Comments
February 27, 2014

Segment 1 - Cut –in Piping

The detail shows air-release manholes with corp. stops? How will the air release operation be executed? Means to drain the manhole?

Segment 1 – WTP Rehab

1. **Raw Water Piping – Maintain back-up supply from Gen Co. during interim operation at C.S. #2. Sheet C5-102**

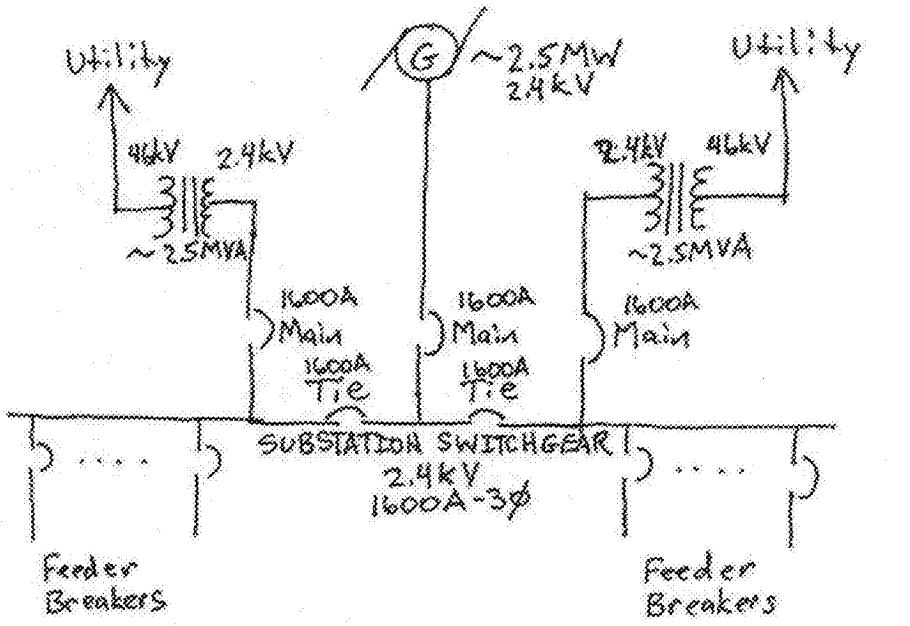
   54X42 cross (Sheet C5-501 & C5-101) only 6-inches – Support?

   Air-release manhole – same as Cut-in piping

   Current yard piping diagram?

2. **Mid-Point CL2 - Basis of design needed**

   - **Application rate (both mid-pt & post for CT)**
   - **CL2 gas max dosage LBs/Day**
   - **Scale – type, capacity**
   - **Rotometer (lbs/day)**
   - **Vacc reg, injector, educator (size)**
   - **Scrubber capacity**
   - **Room air-exchange rate**
   - **Pipe penetrations – Sheet C-103 – linkseal – gas resistant?**
   - **Floor drains**
   - **Door sweep**
   - **Safety features – obs window, fan, lights, switches, panic bar**
   - **Scrubber piping – lower intake**
   - **Check valve/anti-siphon at influent channel**



Flint WTP - Preliminary One-Line Diagram

10/23/13 Electrical Agenda

Would you please review and provide any comments that you may have.

Thanks Warren

J. Warren Green, PE
Director of Engineering

Lockwood, Andrews & Newnam, Inc.
A CH2M HILL COMPANY

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Prysby, Mike (DEQ)

From: Green, Warren <jwgreen@lan-inc.com>
Sent: Wednesday, October 23, 2013 3:41 PM
To: Prysby, Mike (DEQ)
Cc: 'Brent Wright'
Subject: City of Flint

Mike

As you know, the Flint Water Plant (FWP) currently uses 2400V as primary power throughout the facility. All of the power feeders in the plant site are 5kV rated and it appears the existing switchgear is also rated at 5kV. Most of the major electrical improvements installed during Phase I were dual voltage (2400/4160) equipment in anticipation of the plant power being changed to 4160V in the future. However, this voltage conversion is not needed for the phase of work.

The current sub-station has two 2.5 MVA transformers running in parallel for a total capacity 5 MVA. These old transformers are not equipped with cooling fans. Based on the evaluation performed during the Phase II study, which was completed in 2003, the full connected load to these transformers is estimated to be 6.97 MVA while the estimated power load at 36-mgd is 4.22 MVA. Based on these estimates there is sufficient power for the plant with both sub-station transformers in service. Even though the transformers are owned by Consumers Energy, it could take weeks to replace one of these main transformers in the event of a unit failure, which will result in reduced treatment and pumping capacity. The sub-station switchgear was installed in 1960 and is antiquated and difficult to maintain.

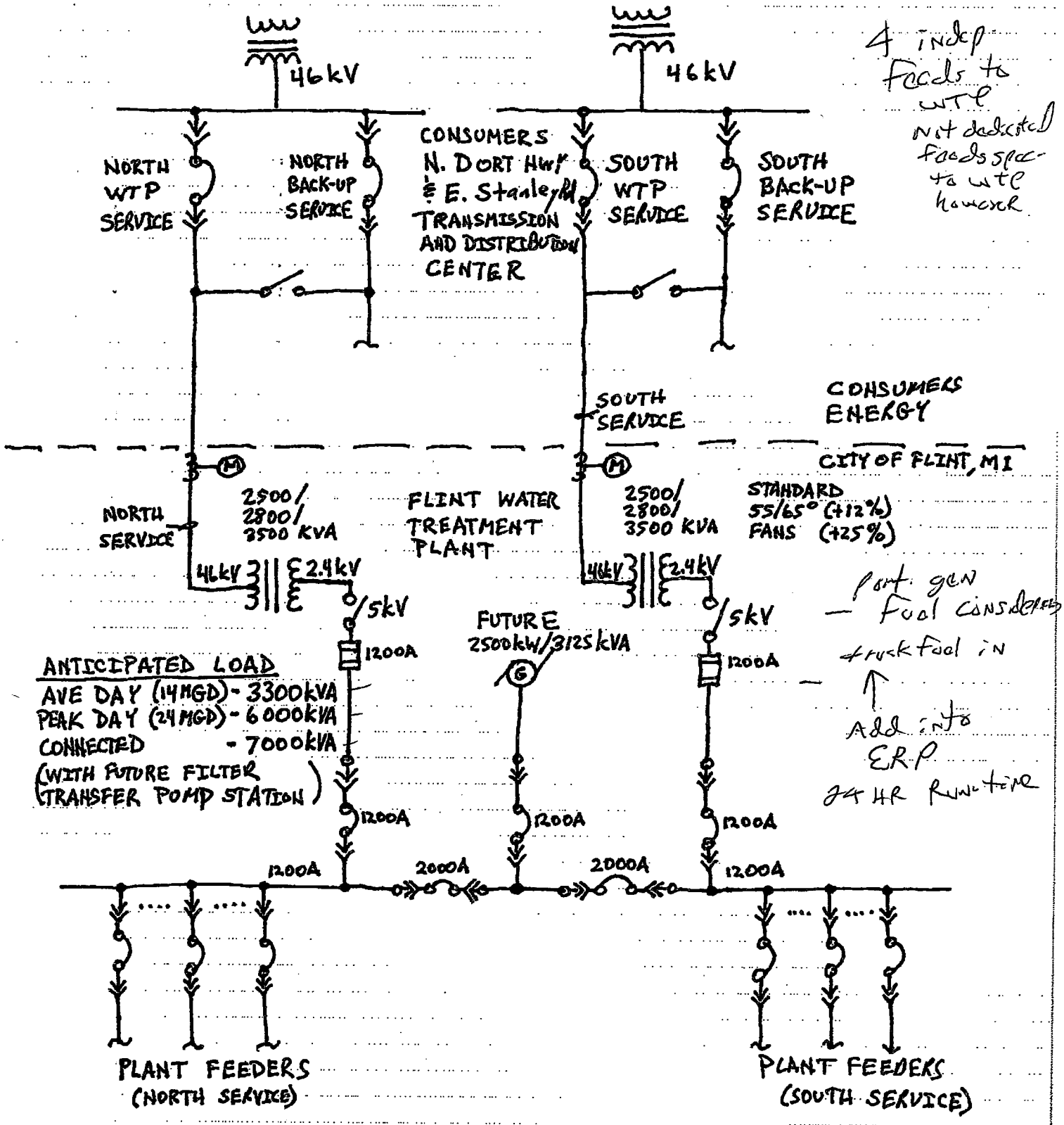
Since the 2003 study, Flint's maximum day water demand has decreased to approximately 20-mgd, which has correspondingly reduced the estimated power load. At this time it is believed that two 2.0 to 2.5 MW transformers will be required to power the FWP to meet maximum day demand and one transformer will meet average day demand under emergency conditions. We are proposing to construct a new substation with two – 2.0 to 2.5 MW pad mounted transformers, along with substation switch gear, interconnected with one 2.0 to 2.5 MW intermittent duty diesel generator as shown below. This arrangement will allow the generator to backup either transformer to cover maximum day demands should one of the transformers or transformer feeds drop off line and to provide sufficient generation capacity to meet average day demands.

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY

DESIGN NOTES AND COMPUTATIONS

SUBJECT: FLINT WATER TREATMENT ELECTRICAL SERVICE IMPROVEMENTS

SHEET NO. 1 OF 1



PREPARED BY Denney Howard DATE 11/4/2013 CHECKED BY Don Richards DATE 11/4/2013 130-10201-000 PROJECT NUMBER

D-005

A G E N D A:
Flint River Transition/DWSD Shutoff
Friday, April 25, 2014

4/25/14
Finalized
Copy

Howard Croft, DPW Director:

- Welcoming remarks, thank you to those in attendance.
- Recognize Elected Officials in attendance.
- Briefly describe recent work to finalize the preparations made to the plant.
- Provide quick facts about plant's capabilities and what they mean for Flint.

Darnell Earley, Emergency Manager:

- I want to highlight and recognize all the hard work done over the last two years that has led to this historic event, including the work of my predecessors Mike Brown and Ed Kurtz.
- I would also like to thank all of our staff, the Mayor, the City Council, Genesee County Drain Commissioner and his office, the MDEQ and Raftelis Financial Consultants for all their work in helping to identify KWA and the Flint River as the best choices for Flint's water needs. Their work is proof that this is the empirically correct course of action.
- The improvements that have been made to the plant over the past few years are in alignment with the City of Flint's strategic objectives, including the Master Plan and the Capitol Improvement Plan, which are steps toward ensuring a self-sustaining and financially healthy water and sewer system for Flint now and into the future.
- Having the resources of the river, the plant and eventually the KWA pipeline will position Flint to take advantage of increased economic growth and help to secure regional stability.

Mayor Dayne Walling:

- This is an historic moment for the City of Flint and I'm glad you could be here to witness it.
- Today we take a huge step forward in controlling the future of our most precious resource and utility by using the Flint River as our primary water source for the

first time in 50 years. This step will also allow Flint to have a permanent backup water source once the KWA pipeline comes online.

- The flipping of the switch we are here to witness today represents the true beginning of Flint's water independence.
- The Flint River was the first major asset to our community, so it is fitting that we return to its use for our city's benefit.
- Our water is safe, clean and tastes great; so come join me in a toast to Flint's future with water drawn and treated right here on this spot.

Toast with Treated Flint River water, followed by media Q & A period (approx. 15 min.)

DRAFT

Prysby, Mike (DEQ)

From: Brent Wright <bwright@cityofflint.com>
Sent: Thursday, June 19, 2014 10:55 AM
To: Prysby, Mike (DEQ); Michael Glasgow
Subject: CL2 Analyzer
Attachments: 20140619_102305.jpg

Mike the CL2 analyzer for PS#4 is already located in the suction well. The stand pipe was hooked up to the sample sink, that now is also pumped from the suction well. Attached is a picture of the tap and water line on the suction side of Pump #7. This water line is connected to a sample pump that pumps the water to the sample sink and the CL2 analyzer. I believe this set up is what you were looking for. If you have any questions please call me.

--

Brent Wright
Water Plant Supervisor
City of Flint
4500 N. Dort Hwy.
Flint, MI. 48505
Ph: 810.787.6537 ext. 3510
Fx: 810.787.3710

CITY OF FLINT WTP
TTHM Response Plan Meeting Minutes
Notes from the meeting shown in red, bold font
November 7, 2014 9:30 am

Discussion Topics

I. Introductions

II. Purpose/Overview

WG provided an historical review of Flint WTP since ~1999 through today including design and regulatory concerns. Phase I improvements from 1999-2005 were completed to allow the plant to operate as an emergency back-up to DWSD supply for a moderate time period (4-6 weeks). Phase II improvements are defined as improvements to allow the plant to operate full time, without DWSD supply. The ultimate supply will be Lake Huron water supplied through the KWA system. The Flint River is the current supply until KWA supply is available. A treatability study was completed in 2002 which evaluated full time supply from the Flint River and contains information that is directly relevant to today's operations.

A. KWA supply timing
   1. Expected completion fall 2016
B. TTHM high level samples
C. Levels at multiple sites indicate source / WTP issue
   1. Problem did not exist on Detroit water
   2. 8 sites likely to exceed OEL

III. Suspected Causes
   A. Source water
      1. TOC has remained consistent
      2. Turbidity has remained consistent
      3. pH has remained consistent
      4. Increase in total Coliform

Period	Turbidity NTU	TOC Mg/l	Alkalinity Mg/l	Hardness Mg/l	pH	Total Col. Count/day
2001 Apr–Oct	7.9	9.4	215	272	8.1	870-1230 (7300 max)
2014 May–Sept	8.1	10.3 5/22/14	205	250	8.1	1500-5000 (22,398 max)

   B. WTP operation
      1. Ozone feed not working properly
      2. Recent increased chlorine feed
      3. Coag or floc polymer aids might not be optimized
   C. Distribution problems
      1. Low flow
      2. Dead ends
      3. Too much storage
      4. **City has unlined CI**
      5. **Cedar Street and West Side pump stations do not pump into defined pressure districts and may be recirculating water**

6. **City has been repairing/replacing valves which could be resulting in flow pattern changes**

IV. Operational Evaluation Report Requirements
   A. Distribution system evaluation
      1. Distribution evaluation and modeling by others
      2. Storage capacity evaluation
      3. **The City is considering water model updates and new simulations to evaluate possible improvements**

   B. Source water evaluation
   C. Treatment evaluation
      1. Jar testing
      2. No ozone piloting
      3. Experiment with coag and floc polymer aid dosages
   D. Timing / schedule

Letter from MDEQ states the report is to be submitted by 11/28/14. However, regulations state the public water supply has 90 days from the date of violation to complete the Operational Evaluation Report and Flint has technically not had a violation yet. The next sampling period is the 3rd week of November. SB stated the MDEQ would like to have a draft report by 11/28/14 that would not need to be entirely complete, but this would show a proactive approach by the City.

V. Possible Solutions
   A. Chlorine dioxide or chloramine

LAN believes there is a reasonable chance that chloramine would not be a strong enough disinfectanct but chlorine dioxide warrants further consideration.

   B. Decreased chlorine feed rate

A portion of flow through the WTP was being bypassed around the softening process and it was believed to be contributing to chlorine demand. The City has discontinued the bypass and it appears chlorine demand has dropped by 0.5 – 1.0 mg/l.

   C. pH adjustment
   D. Corrections/modifications to ozone

The City and LAN have looked at the ozone feed system and data suggests there is a problem though the exact issue is yet to be determined. Further investigation is planned as one high priority response.

   E. Coag & floc polymer aids (better TOC removal)

Jar testing is planned as part of the OER during which polymer aids will be further evaluated.

   F. Enhanced TOC removal with softening
   G. UV??? [with chlorine after for residual]
   H. Flushing to decrease water age?

The City is considering increased flushing to address both water age and rusty water.

   I. Lower storage tank high water levels (use less volume)?

VI. Other

- Chlorine demand through the filters is another concern. The City may shock the filters with high chlorine feed in an attempt to 'cleanse' them.
- Addition of flocculation and/or coagulation polymer feeds: MDEQ is open to the idea and would consider a letter submittal from the City listing the details in order to provide approval if the City wants to implement into the WTP process.
- The average flow through the WTP has fallen off from 18-19 mgd over the summer to ~14 mgd at this time.
- A TTHM limit violation is Tier 2 and will require the appropriate public notice.
- The City is currently achieving ~60% TOC removal.
- pH is currently 7.5-8.0 at WTP effluent.
- Costs to reconnect to DWSD supply have become prohibitive as a viable solution: $4 Million start up fee + $900,000 monthly flat fee + usage charges.
-

November 7, 2014

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY
1311 South Linden Road, Suite B • Flint, MI 48532
T 810.820.2682 C 517.819.2367

Sign-in Sheet
City of Flint TTHM Response
MDEQ Meeting

Date/Time: 11-07-14 @ 9:30 am

Location: LAN Okemos Office

Name	Company	Phone Number	Email
Steve Busch	MDEQ	517-643-2314	buschs@michigan.gov
Michael Prysby	MDEQ	517 290-8817	PrysbyM@michigan.gov
JEFF HANSEN	LAN	810-820-2682	jrhansen@lan-inc.com
Pat Cook	DEQ	517-284-6514	cookp@michigan.gov
Daugherty Johnson	Flint	810 577-8906	djohnson@cityofflint.com
Howard Croft	FLINT	810 577-1202	hcroft@cityofflint.com
Warren Green	LAN	630-495-4123	jwgreen@lan-inc.com
MIKE GLASGOW	FLINT	810-787-6537	MGLASGOW@CITYOFFLINT.COM
BRENT WRIGHT	FLINT	810-787-6537	bwright@cityofflint.com
SFM	LAN	517-203-5437	sfmatta@lan-inc.com

CITY OF FLINT WTP
TTHM Response Plan Meeting
November 7, 2014 9:30 am

Discussion Topics

I. Introductions

II. Purpose/Overview
- A. KWA supply timing
  - 1. Expected completion fall 2015
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- B. WTP operation
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   A. Chlorine dioxide or chloramine
   B. Decreased chlorine feed rate
   C. pH adjustment
   D. Corrections/modifications to ozone
   E. Coag & floc polymer aids (better TOC removal)
   F. Enhanced TOC removal with softening
   G. UV??? [with chlorine after for residual]
   H. Flushing to decrease water age??
   I. Lower storage tank high water levels (use less volume)???

VI. Other

Optimize batch system of
No-reserve of pump station water
Hydraulic ?

Fr. 05/07/14

First Mtg - 930 AM

Phase 2 - 4 Mill.

Wed 4/16 Mtg noted

Wastewater Study - 1 in 820 WORK Jan 6

Zarkon Pilot Time → PHASE 2 18 Months

Pam Study MRK

TTHM Pot 350 PPB - 440 PPM

@ Cl2 - 1.7 - 2.9 mg/L dosage

5 months chloroform

Fecal TC - 500 - 1200 MPN 7500 approx

@ 2 mg/L DO → 11-30 cont (goal 4)

3 mg/L → 5-16 cont

1 mg/L - 5% ↓

TOC = 10

@ Peak +2 hr → > 5% removal

TURBS — 10 NTU
Softy — 2-3 NTU
Study

Current — 0.7-1.0

Seen Big ↑ in TC

Not seeing as good performance From Ozonators

Not generating enough DAX
only 600 LBS/DAY per generator
rated @ 1300/DAY

In treatability Study

O_3
↓
$FeCl_3$ + Poly
↓ TOC
C20
Soda Ash → Cl_2 →

currently ~~we~~ NOT doing poly & Soda Ash

Need Soda Ash for NON CARB TOM.
& will add in TOC TOM.

Challenge
3- 3-5 Cl_2 demand in Filters
& is very high

In study } 2-2.5 mg/l O_3
} & 0.5 mg/l Cl_2

Gut + bot is not the case

Dist system — Res. Dance time issue

3 treatment needs
① ↑ O_3
② D-PE Coag/Soft to ↑ TOC Rem
③ ↓ Cl_2 demand @ Filter

2 issues @ WTP
TOC - reduce
TC
Cl_2

D-St
water age ↓
adapt to Cl_2

if TOC can be reduced, then look @ Cl_2

Consider

ClO_2 – Chlorine dioxide ≈ 2.6X stronger than Cl_2

Humic acids } could help in
Filter Aids } TOC ↓

Coag aid — ANIONIC @ 10 mg/L
Flocc Aid — NON IONIC .05 mg/L

* Air Stripping system come in at
5 – Million — 1½ to build
Solar Boost

Dust

UNDER Flushing Program
Valve fixing helps
But is overstated

DEPARTMENT OF ENVIRONMENTAL QUALITY

GOVERNOR'S OFFICE BRIEFING PAPER
CITY OF FLINT DRINKING WATER

What contributed to the Boil Water Advisories in the city of Flint?

A number of factors, not one specific cause, likely contributed to the Boil Water Advisories (BWAs) in the city of Flint during August and September 2014. While use of the Flint River has increased the amount of natural organic matter in the city's water, the Flint Water Treatment Plant (WTP) has performed well above treatment requirements for organic carbon removal. In addition, less than 20 percent of the water system was included in the advisory area. If treatment had been compromised, detections would have been widespread throughout the city, rather than in such a localized area.

The city's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the city's over 550 miles of water mains are now over 75 years old and constructed of cast iron piping. Cast iron pipe is subject to internal corrosion, called tuberculation, which causes buildup on the pipe interior, leading to water quality issues, reduced flow and pressures, and leakage. Tuberculation also encourages the development of biofilms, layers of bacteria that attach to the interior pipe wall. Biofilm growth is common in areas of piping with little or no disinfectant residual, and together with tuberculation can clog water lines to the point of insufficient water pressure.

The city has also experienced decades of a declining user base and water use associated with vacant homes, commercial businesses, and industrial property. Declining water use leads to excess residence time within the city's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and disinfectant residual degradation. While the city has recently seen an infusion of funding for blight removal, contractors completing this work have been improperly using fire hydrants, causing hydraulic disturbances that dislodged and suspended settled debris, which may have contributed to the bacterial contamination.

The winter of 2014 was also one of the coldest experienced by the water system. The city, which historically has unaccounted water losses of over 30 percent, has seen even greater losses since February 2014 due to an increase in cold weather-related water main breaks and leaks. The city lacks a formal maintenance program for its over 7,250 valves, which would normally be used to limit impacts during break repairs. Two valves on the transmission line used to supply the area of the BWAs were found to be closed during the city's investigation, causing longer residence time, reduced disinfectant residual, reduced flow, and reduced pressure. One of these valves has remained broken.

The BWAs also occurred during the warmest and, for 2014, relatively wet periods of August and September. Warm weather conditions are not only more conducive to bacterial growth but also degrade the water's disinfectant residual carried out from the WTP more quickly. Longer residence times, biofilms, and tuberculation also contribute to disinfectant residual degradation. Warm wet weather conditions also allow water contaminated with bacteria to pool around piping with leaks and breaks.

Process for Issuance and Cancelation of a Boil Water Advisory

There are a number of conditions that can trigger BWAs. This includes the following:

- Bacteria Monitoring Detections
- Bacteria Standards Violations
- Treatment System Failures
- Waterborne Disease Outbreaks
- Loss of System Pressure
- Water Main Breaks
- Other Interruptions in Service

The Department of Environmental Quality (DEQ) has developed a policy and procedure regarding BWAs to help guide staff, provide consistency, and maintain public health. A PDF of Policy and Procedure No. ODWMA-399-022 is being forwarded with this briefing paper.

BWAs may be self-initiated by the water system, issued collaboratively in consultation with the DEQ, or when necessary mandated by the DEQ. Requesting customers to boil the water when bacterial contamination has occurred provides an added barrier of public health protection.

The BWAs that recently occurred in the city of Flint were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the city of Flint collaboratively in consultation with the DEQ.

Current regulations regarding monitoring and standards for bacteria in water distribution systems were developed by the U.S. Environmental Protection Agency, have been in effect since 1990, and were incorporated into the Michigan Safe Drinking Water Act, 1976 PA 399, as amended. There are a variety of bacteria, parasites, and viruses that can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, water systems test for total coliform and *E.coli*. Total coliform bacteria react to water treatment in a manner similar to many pathogens. Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system minimizes the likelihood that pathogens are present. *E.coli* is itself a pathogen, and its detection would be direct evidence of a health risk.

Once a BWA has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Using the most common analytical method, samples must be incubated for a period of 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a BWA. Adding each of these steps together, a normal response period to cancel a BWA under these circumstances would be expected to take at least 3 to 4 days.

Recent History of the City of Flint Water System

Historically, the city of Flint had been a customer of the Detroit Water and Sewerage Department (DWSD) while simultaneously maintaining the Flint WTP to provide emergency backup service using the Flint River. The WTP performed quarterly test operations to maintain readiness and was utilized twice in 2009, supplying water once for 2 days and the other for 3 days.

In April 2013 the city of Flint notified the DWSD that it would be terminating service in the future and contracting for raw water service from the Karegnondi Water Authority (KWA). Work on the KWA pipeline from Lake Huron broke ground in June 2013 and is expected to be completed with connection in late 2016.

In August 2013 Rowe Professional Services Company completed an engineering proposal for improvements to the Flint WTP that would allow continuous operation of the WTP utilizing the Flint River in lieu of continuing service from the DWSD until completion of the KWA pipeline. In March 2014 the city of Flint entered into a Consent Agreement with the DEQ regarding the Flint WTP's lime sludge facility. In April 2014 the DEQ issued a construction permit for improvements to the Flint WTP. On April 25, 2014, the city of Flint began continuous operation of the WTP, using water from the Flint River and discontinued the purchase of water from the DWSD.

A BWA was issued for August 15-20, 2014, for a portion of the city of Flint due to localized detections of total coliform and *E.coli* bacteria. Another BWA was issued for September 5-9, 2014, due to localized detections of total coliform bacteria in the same and adjacent portions of the city of Flint. The advisory covered an area of approximately six square miles. The city of Flint has a total land area of just over 34 square miles.

While many of the BWA contributing factors listed above require long-term solutions, the city has taken operational steps to limit the potential for a BWA to reoccur. The city has increased flushing of water mains to limit residence time, maintain disinfectant residual, and help remove buildup and deposits within the piping. The city is boosting chlorine disinfectant residual at locations in the distribution system as needed. The city continues to investigate water leaks and water main breaks and the status and condition of system valves.

Prepared by: Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
Department of Environmental Quality
October 1, 2014

Update Aeration mtg notes

Tues 9/30/14

First MTG

Aug 2014 Journal Article to

↓ TZHM's

w. Utility Services

lost-treatment aeration — either at POE or in targeted areas of system ← not a new technology

↓ help w. THMs not HAA5's

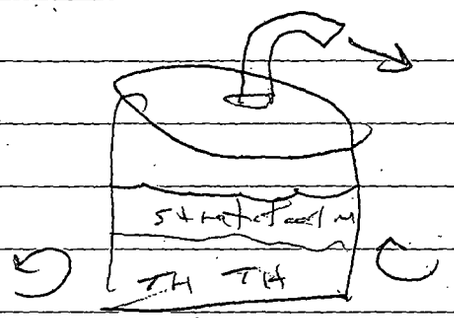
First use CO_2 as pH adj

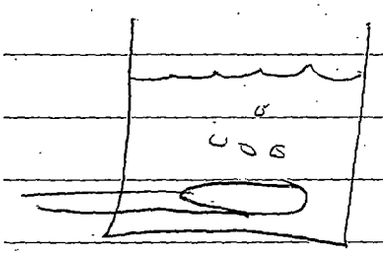
3+ yrs

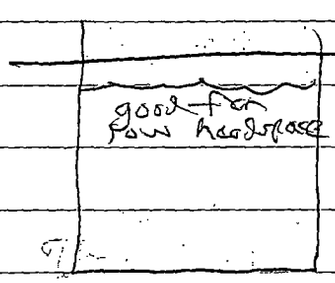
6 B.BBle/ surface sprox aeration

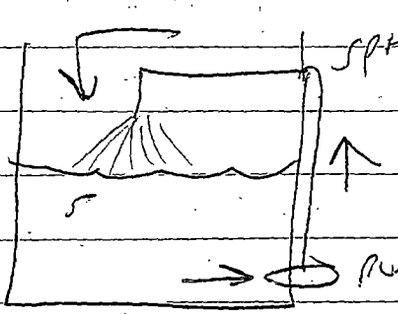
Henry's Constant — Chloroform most volatile

ΔP ↓ ⇌ is the driving force for aeration







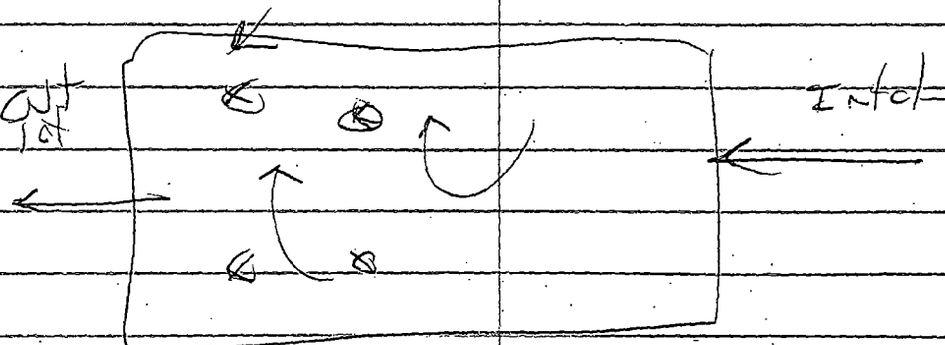


Droplet Distr.
Mixing intensity
Air Handling
Fluid Modeling

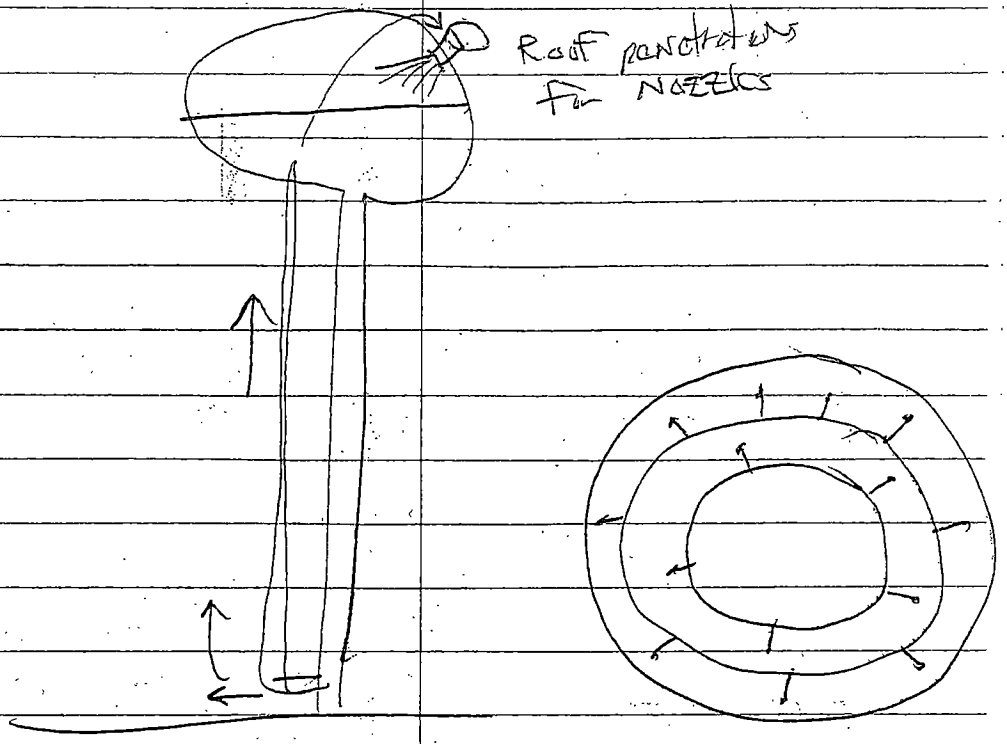
Generates a load of heat
small droplets are better
Big drops not as efficient transfer
But disturb the surface better

Electrink — SPRAY / Misty — is Rack

G-Sto — Surface Aeration
— Not as subject to clogging
Add mixer too



TRS Monitor → Data Logg & Monitor
Current Draw (Range) — alarm if falls out of Range
→ Filtration of Air — options Avail



Prelim Designs

EIO Tank →	63	Spray Nozzles	50%
Cedar	12	Surface Aerator	75%
W-5 (MAK)	4	Surface Aerator	45%
DART	17	Surface Aerators	75%

Clearwell Treatment

Final Thoughts

- water Make
- Taste (stay @ Clearwell)
- ATM MAK removals

we want

Write-up RFP

have info other on stage

Cost for Hemlock - ?
could be 10-12 M if
needed & all facilities
can spread out the costs
talk to Duffy on what's avail. in Budget

Start @ Clearwell then
Expand to other facilities

* Must have hi/lo mode calibrated
& accurate to eval. O&M.
benefits when working on C.S/
W.S

(is it more cost effective to
pump str. to DART & treat than
vs. clear well & O&M. storage)

CORTEZ

Directive Mtg notes

Mon Oct 6th Director Mtg

1. Why is Flint in State?
2. What happens in MI NOW?
3.

↓

TTHM - EM office
Engaged?

Steps need to be proactive

- City council looking to do Analysis w. OWD
- Sched. Briefing w. EM
  - opens - Go back
    Go Back & Clean
    react
    Nothing
  - need to be proactive on city
    Power to DN
- Mtg. w. EM
  - then ~~reorg~~ to wk on
    Assess & Announce on Plan

Gov. Needs Briefing on Flint Situ.

– BWA – Address it

Support • Source? Cause – evidence of contam.
if e.coli – direct evid. of
1st – yes (e.coli) sewage contam.
2nd – No (e.coli)

Summary

– ✓ old systems – large/old pipes
✓ flow (low)
✓ stagnation
✓ fluctuation
– Biofilm – less effective Cl2 residuals
– corrosion/urban renewal / bad flushing / breaks
– coliform → Evidence of contam.

1½ days

Need 2nd? → Process of issuing a BWA?

✱ – self initiated by CWS
– DEQ – results – other BWA is necessary
who made the call wrt Flint → collective
hit 5% RCE → LCR for sampling 30 days
But E Coli → 24 HR notice

✱ For Total Coliform std → EPA → adopted by MI.
Back in 92 → if hits trigger → state has
authority to act. BWA / → self
or collective
We have policy on issuance of BWAs

✱ lifted → corrective meas. Necessary
confirmatory samples – 25 to 24 hrs apart
if U/O MCL
1 set if ✱

– Spelled out Monitoring Requirements
For dist system

History — switched on 4/25/14 from DWSD

Met w. gov. 2013 (AIRC) — Flint wanted to use Flint River & Appeared to pull away from DWSD & BC on Lake Huron by 2016

Last issue

MGT of WTP → Pot. for further BWAs?

Top soil July-Sept ↑ inc. of TCR vios

- warm conds
-
- Mid next week (Next Tues)

* Public Relations — Bill White - Leads Matt Foundations

Concerns/mistrust wrt water system.

Is it safe?

Ability to manage problem

Likelihood to happen again

3rd party verification — willing to hire 3rd party!

Was it correct decision to leave DWSD?

Summarize up to this point

Stoke work w. leads on WQ

Stac add → Add. staff. Matt called DC to help out in dist. system → Invest in maint. to help support the local comm.

Service lines (lead) —

Briefing Message to Gov

Current situ

Process

History

↓

Summ. w. 3 points

1. Ensuring safe DW
   - Protection w. Flint-Del
2. Engage locals

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING DISTRICT OFFICE

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

September 10, 2014

Mr. Brent Wright
City of Flint Water Treatment Plant
4500 North Dort Highway
Flint, Michigan 48505

9/10/14
TTHM OEL
Exceeds MCL

SUBJECT: Compliance Communication
Total Trihalomethane Operational Evaluation Requested

Under the Stage 2 Disinfectants and Disinfection Byproduct Rule, the City of Flint has been required to collect samples for the analysis of Total Trihalomethane (TTHM) and Haloacetic Acids (HAA5) at eight sites within the City's water distribution system. The City has completed two quarterly monitoring periods since changing its source water to the Flint River effective April 25, 2014.

Normally an Operational Evaluation Level (OEL) would be calculated in accordance with the Michigan Safe Drinking Water Act, Public Act 399, 1976, as amended, Administrative Rule 7196 (R 325.107196), each quarter once three quarters of results have been obtained and compared with the respective maximum contaminant level (MCL) for TTHM. Normally the calculation would be made as follows:

(2 x current quarter + sum of 2 previous quarters) divided by 4

As the City of Flint currently has only two quarters of data, the calculation has been modified as follows:

(2 x current quarter + previous quarter) divided by 4

The resulting OEL for each site is listed in the table below. All results are in parts per billion (ppb):

	TTHM			HAA5		
	5/21/14	8/21/14	Mod. OEL	5/21/14	8/21/14	Mod. OEL
DBP1 McDonalds 3719 Davison	162.4	145.3	113	64	43	38
DBP2 Liquor Palace 822 S. Dort Highway	111.6	112	84	52	40	33
DBP3 North Flint Auto 3302 S. Dort Highway	96.5	127.2	88	48	31	28
DBP4 University Market 3606 Corunna	106.4	181.3	117	55	24	26
DBP5 B&P Gas Station 2501 Flushing	75.1	196.2	117	38	17	18
DBP6 Salem Housing 3216 MLK Boulevard	82.2	112.4	77	41	25	23
DBP7 Kroger 5018 Clio Road	88.2	144.4	94	49	30	27
DBP8 Taco Bell 6204 N. Saginaw	79.2	118.3	79	50	37	31

Briefly Message to Gov

Current sitx

Process

History

↓

Summ. w. 3 points

1. Zoning site Dw
2. Procedure w. Plat - DEL
3. Engage locals

As shown in the table above, even with this less restrictive modified method, six of the City's eight sites already exceed the OEL limit of 80 ppb for TTHM. In addition, the City's two other sites are both more than 95% of the TTHM OEL limit.

The MCL for TTHM and HAA5 is based on a locational running annual average for each site, essentially the average at each site over the four previous quarterly monitoring periods. However, with TTHM levels of this magnitude, it is likely the MCL will be exceeded for at least one of these eight sites from just three quarters of monitoring results. For TTHM, four quarters at the MCL of 80 ppb (4 x 80) would provide 320 ppb allowable. As an example, site DBP1 through just two quarterly monitoring periods has a total of 307 ppb (162+145), leaving only 13 ppb over two more quarterly monitoring periods to maintain compliance with the MCL.

Therefore, this office is requesting the City of Flint complete an Operational Evaluation in accordance with Administrative Rule 719l (R325.10179l). The Operational Evaluation Report shall be submitted to this office no later than November 28, 2014. The report shall not be limited in scope and shall include the following:

Examination of Treatment Operational Practices
- Changes in source water quality
- Treatment changes
- Storage tank operations
- Excess storage capacity
- Treatment problems that contribute to TTHM formation

Examination of Distribution Operational Practices
- Storage tank operations
- Excess storage capacity
- Distribution system flushing

The report shall also include steps the City could consider to minimize future exceedances.

Additional guidance on completing the Operational Evaluation Report, including a number of forms that can be used to gather and evaluate water system information is provided in the United States Environmental Protection Agency's (U.S. EPA) Operational Evaluation Guidance Manual. This document is available on the U.S. EPA's website at the following link:

http://www.epa.gov/ogwdw/disinfection/stage2/pdfs/draft_guide_stage2_operationalevaluation.pdf

Be advised, failure to submit an Operational Evaluation Report by this deadline is a reporting violation subject to Tier 3 Public Notification.

The OEL is an indicator of operational performance. The water system must take proactive steps to be able to comply with the MCL's for TTHM and HAA5. While it is recognized that removal of Total Organic Carbon disinfection byproduct precursors as part of the treatment process has performed above minimum removal requirements under the treatment technique, around 4 parts per million of organic carbon are still present in the treated water and may be leading to additional TTHM formation in the City's distribution system.

While health effects associated with disinfection byproducts contaminants are based on chronic exposure, the City has available alternatives that must be considered to achieve compliance with this drinking water public health standard.

History — switched on 4/25/14 from OWSD
met w/ gov OOD (Airl) — Pint wanted to use Pint River & agreed to pull away from OWSD & be on Lake Huron by 2016

Last time
MGT of WTP → p.t. for further BWAs?

Tap fee July-Sept ↑ end of TCR visit
= warm cust.
=
- mid next week (Next Tues)

* Public Relations — Bill white - local Matt Foundations
Concerns/restrict WRT water system.
IS IT SAFE?
Notify to merge problem
Likely to happen again
3rd party verification
Will it cancel decision to leave OWSD?
willing to hire 3rd party

Summarize up to this point
Steve will work on MQ
Steve add → Add stuff matt called DC to help out in cust. system → invest in maint. to help support the local economy
Service lines (lead) —

If you have any questions regarding this information, please contact me at the number below.

Sincerely,

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and
Municipal Assistance
Lansing District Office
(517) 290-8817

cc: Mr. Darnell Early, City of Flint
Mr. Daugherty Johnson III, City of FLint
Mr. Howard Croft, City of Flint
Mr. Robert Bincsik, City of Flint
Ms. Liane Shekter Smith, P.E., DEQ
Mr. Richard Benzie, P.E., DEQ
Mr. Stephen Busch, P.E., DEQ
Genesee Co. Health Dept.

Gov. needs ● acting on First ●.

— BWA – Does it

Current • Source ? case – evidence of custom.
if exist – date end of
1st – resolution source custom.
2nd – no cancel)

Summary

- ✓ Old system – large/old HO
- ✓ Flow Chart
- ✓ Explanation
- ✓ Duplicate
- Brattain – case affecting CL residents
- Greater/when renewal / authority/ants
- Action → Evidence of custom.

1½ pgs

Prior 2nd ? → Process of issuing a BWA ?

- ✱ – self-initiated by CWS
  – Dec-results — attn BWA is necess.

Cole made the call with First → collective

Ht 6% RCD → (N for spec. long 30 days yr
But ∈ Col. → 24 hr notice

- ✱ Re Ft Thel Status → EPA → adopted by MEI.
  Back in 92 → if Cols to issue → State has
  authority to attn. BWA / → staff or collective
  use Lee policy on issuance of BWAs
- ✱ Ifted → corrective mess. news
  Confirmatory/ supplier — 2 sets 24 hrs apart
  if w.o. MCL
  1 set if ●

– Spelled out Monitoring Reqs
For dist system

Prysby, Mike (DEQ)

From:	Prysby, Mike (DEQ)
Sent:	Tuesday, January 08, 2013 4:36 PM
To:	Shekter Smith, Liane (DEQ)
Cc:	Bloemker, Jon (DEQ); Busch, Stephen (DEQ)
Subject:	Flint WTP

Liane,

Eric Kline from the Department of Treasury, Office of Fiscal Responsibility returned my call with several questions concerning the operating requirements of the Flint WTP. Eric is aware that Flint has been a DWSD customer since the 1960s and that the city is currently at the crossroads of either remaining a customer of DWSD (either blending or total DWSD purchase) or breaking away from DWSD and committing to the KWA project. The Department of Treasury is currently investigating these options to determine the best long term financial option for Flint.

Eric's first question:

Are there any scenarios where the DEQ would allow Flint to totally decommission their WTP?

My response first included a brief discussion of the history of the Flint WTP and the city's obligation to maintain and operate the facility on a test-run basis to provide an adequate back-up supply of water to the city and Genesee County in the event that the supply of water from Detroit (single transmission line) is interrupted. Eric appeared to already have a good understanding of this topic. Next, Flint could only decommission their WTP if the city was to establish 2 independent sources of drinking water – either DWSD with KWA (back-up) or vice versa. This option would be difficult since KWA's intention is to sell untreated water to members of the authority including Flint. In this scenario, Flint may need to become a customer of Genesee County, not KWA. Otherwise, the city would need to establish 2 independent sources from Detroit.

Q2: Does Genesee County currently have a water treatment facility?
A2: Genesee County currently purchases water from Flint as a wholesale customer; thus the county does not have their own
WTP at this time.

Q3: Does the DEQ take any stance on the possibility of Flint blending treated water from its own WTP?

A3: The city of Flint may elect to utilize their WTP for the blending of treated water from the Flint River with water purchased from DWSD or KWA provided that all applicable drinking water standards are maintained. The city would also be encouraged to produce water of the same aesthetic quality to the water currently purchased from DWSD. Thus, DEQ does not have an objection to the option of blending.

Eric indicated that he may contact me again if he has any further questions of which I will provide the necessary updates.

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 335-6122

2/10/11 WTP visit & water

City of Flint Water System Discussion
Water Treatment Plant/Water Distribution System
2/10/2011

WATER TREATMENT PLANT:

Prelim eng report

1. **Hamilton Dam – Project status?**

   - **Preliminary design – conforms to low service pumping needs?**

2. **Water Treatment Plant Test Runs - Test runs performed in 2010 - reports?** can't get into office → Aug 10 - Run; Mar 10 - Run; April 10 - Run

   No. of test runs with intermediate CL2?

   send us test reports

3. **High Service Pumping - long range future use level identified?**

4. **Operator Certification - OIC oversight at WTP during;**

   WTP downtime -
   Routine test-runs -
   Emergency Operation -

   Staff from Genesee County – memo of understanding?

5. **Water System Contingency Plan/WTP SOP**

   review of both documents with comments

   ERP required in place of Contingency Plan

   → entity looking ERP only - wide

   But will send ERP template

look on 72 — same area Genesee Rd near
draining into Nearby Storm Curbs

Pipeline issues in 2010? Potential problems in 2011 or beyond?

→ Fax all Bay Rd Ltrs to M. Bloom (6a) 793-5758

6. WTP Sludge disposal at Bray Road – city's intentions? - based on EMRD's requested work plan…

No talks yet on this
City needs to address EMRD's requests / new items for WTP
what is the DNRE waiting on to do on the city's part?

WATER DISTRICTION

7. Pumping Stations

- Resubmittal for DWRF in 2011
- Seasonal interim switchgear upgrades

Cedar Street/Torrey Road/Westside pump stations

Status of upgrades at each station? — revised into NOW DWRF APPL in SPR 11

8. Reliability Study

Phase II Study – status? — At point now for Alternate for CIP now plan on how to sequence with to get Phase II completed

Amended Phase I document? — Amend Phase I & submit w/ Phase II

Model up & running
Waiver are set-up
Hydr are all stored & done

Global Items: stop-more CIP & evaluated with Fitch as it becomes Genesee

Karegnondi Water Authority/DWSD Second Pipeline

Flint's capability to participate? Track $ &
Additional improvements at WTP? — Focusing on
New contract with DWSD? —
Genesee County Relationship/Contract? —

2011 Needs Survey - reliability study to be used as source for independent documentation.

The GLOBAL ISSUE

Blending — Not Benefit due to DWSD's toady to serve charge — would cost us more to blend

Break from DWSD — 5-6 yrs

* Regional car if Karagindi * Eason's thoughts

City wants to support it's own

Not Dep. on DWSD — & invest its own WTP

focus on River, if Karagindi

* Do will Bond tied to pub. improve fund hoping for

→ Soma to invest in WTP Eason's WTP

Prysby, Mike (DEQ)

From: Brent Wright <bwright@cityofflint.com>
Sent: Friday, May 16, 2014 1:40 PM
To: Prysby, Mike (DEQ); Busch, Stephen (DEQ)
Cc: Howard Croft; Daugherty Johnson; Michael Glasgow
Subject: Fluoride application at The Flint Water Treatment Plant

Gentleman per our earlier conversation Flint WTP would like to suspend the application of Fluoride in its treatment process until the first part of June, 2014. With this being our first month of operation and 2/3's of the operation staff in training, I feel the citizens of Flint would be better served if the operation staff were able to just concentrate on primary drinking water standards at this time. Please respond with any thoughts or concerns you may have regarding this matter.

Thank you

--
Brent Wright
Water Plant Supervisor
City of Flint
4500 N. Dort Hwy.
Flint, MI. 48505
Ph: 810.787.6537 ext. 3510
Fx: 810.787.3710

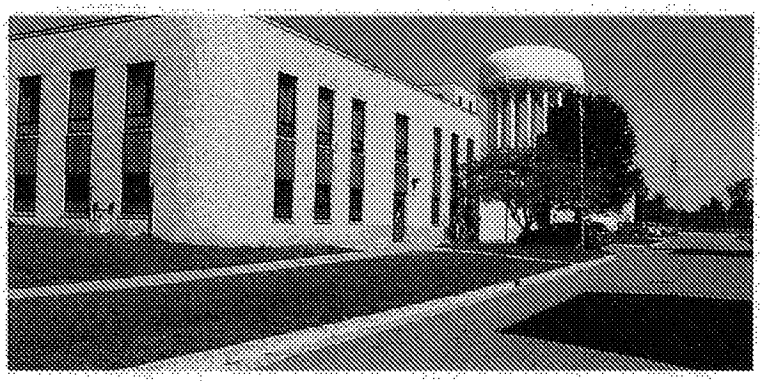
Flint TTHM Violation
Completed Calls from the Public
MFP

1/5: Mike P.-Ron Fonger – Flint Journal – Media inquiry
1/5: Mike P. - Lawrence Reynolds – Mott Children's Health
1/5: Mike P. - Walter Smith-Randolth – NBC 25 Flint News – Recorded interview
1/5: Adam R. – Denise – Flint Resident

1/6: Mike P. - Arthur Woodston – resident – general questions, invite to res. Mtg
1/6: Mike P. - Bradley - resident – ok to boil water for baby formula bottle?
1/6: Mike P. - Raimy Elley – resident – gen info., most upset on city's delay to notify
1/6: Mike P. - Reps. Sheldon Neeley and Phil Phelps – update State Reps for Flint Districts on TTHM issue. Richard Benzie and Sarah Howes participated.
1/6: Steve B. – Cheryl Wormsman – friend of Flint resident- general questions/concerns

1/8: Mike P. – Sandra Wilkes – resident – excessive cost for poor quality, who can force Flint to re-connect to Detroit…
1/8: Mike P – Arthur Woodston (2nd call). Recc. Not to drink water from doc…where do I go?

1/9: Mike P – Patricia Warner – Gen. info…excessive cost/poor WQ, better comm. from city needed
1/9: Mike P – Jeanette Doll (DTMB) – left message to call me back concerning alt. water for state Bldg.. in Flint. Answer ? pertaining to future TTHM results and PN. Call most likely to ensue on Monday 1/12. **** Completed call w. Jeanette on 1/12 and answered her question pertaining to future TTHM monitoring and how it will pertain to compliance.**
1/14: Mike P – Mindy Blasdeel – resident – daughter with skin rash since being on DWSD water, On-going bladder infection – Mindy was at physician office and call was cut short. I will contact Mindy tomorrow to finish our call.
1/20: Mike P- Paris Glazer (Assoc. Attorney – LaRose Bosco law firm) – determining validity for Case claim (Fed. Statute claim) for Flint residents. Are there any way(s) to remediate high TTHM levels before KWA? Possible FOIA…..



CITY OF FLINT
WATER SOFTENING TRAINING

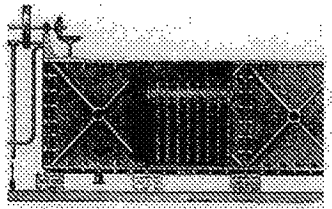
September 10, 2013

Lockwood, Andrews & Newnam, Inc.

Sept 26 G
Softening
training @ EAP

WATER SOFTENING

- Process of using quicklime and soda ash for hardness removal was first used in 1841.
- Called the Porter-Clark method
- Chemical equations and dosage calculation methods are still used today.
- Driven by brewers and distillers because hard waters interfered with fermentation and facilitated the growth of undesirable organisms.
- Determined with a soap test.



18—Porter-Clark Water softening and Filtering

THE WORD HARDNESS, IMPLYING THE HARD OR HARSH FEELING TO THE HANDS, IS THUS USED IN A PURELY TECHNICAL AND COMMERCIAL SENSE.

S. RIDEAL, D. SC. 1902

imp. equiv

↓

Ca mg/l * 2.5 = mg/l of Ca Hardness as CaCO3

Mg mg/l * 4.12 = mg eqv as CaCO3

TH of H

Softening Terms

- What Causes Hardness in Water
  - Divalent Metallic Cations
    - Primarily Calcium (Ca^{++}) and Magnesium (Mg^{++})
    - (Strontium (Sr^{++}), Iron (Fe^{++}), Manganese (Mn^{++}))
    - Largely Derived From Contact with Soil and Rock
- Types of Hardness
  - Calcium
  - Magnesium
  - Carbonate (CH)
  - Noncarbonate (NCH)
  - Negative Noncarbonate (NNCH)
- Total Hardness = Calcium Hardness + Magnesium Hardness
- Reported as mg/l as $CaCO_3$

Alkalinity

- What is Alkalinity
  - Water's Ability to Buffer Radical pH Changes or its Capacity to Neutralize Acid
- Types of Alkalinity In Water
  - Bicarbonate (HCO_3)
  - Carbonate (CO_3)
  - Hydroxide (OH)
- Determined in the Lab by Titration with H_2SO_4
- Two Indicators are Used – Phenolphthalein & Methyl Orange
- Two Alkalinity Values can be Included on Lab Report
  - Total (T) and Phenolphthalein (P)
- Also Reported as mg/l as $CaCO_3$

Ca^{+2} combined with HCO_3^- → CARB HARD

$+2 + \underbrace{C}_{\text{needs 2 of em}}$

$Ca(HCO_3)_2$

Mg^{+2} CO_3^{-2} → 1:1

$MgCO_3$ → CARB HARD

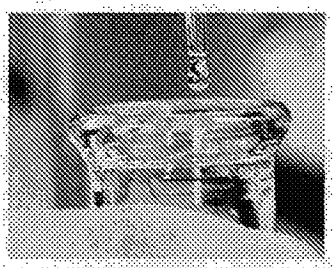
How to determine which type of alk. you have Based on P alk & T alk

Alkalinity Relationships

plug & chug

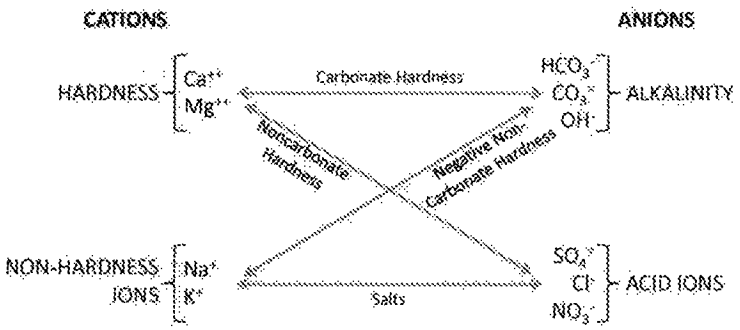
Hydroxide Alkalinity as	Carbonate Alkalinity as	Bicarbonate Alkalinity as
P=0	0	T
P<1/2 T	0	T-2 P
P = 1/2 T	0	2 P
P>1/2 T	2 P - T	2(T - P)
P=T	T	0

KEY: P = phenolphthalein alkalinity; T = total alkalinity

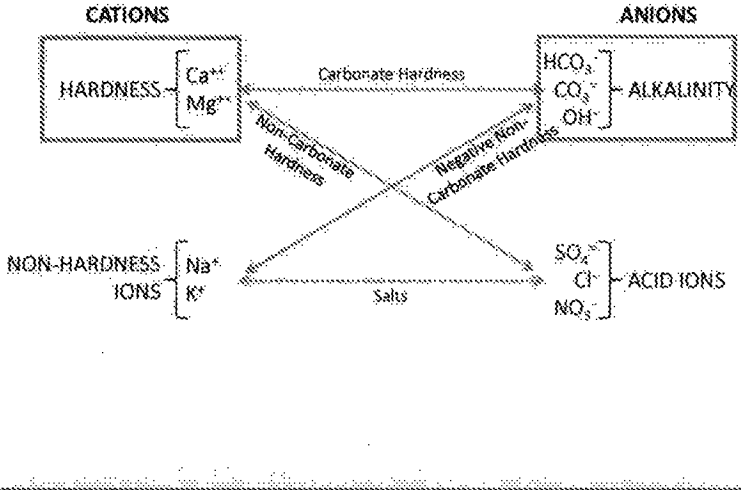


HYDROXIDE, CARBONATE & BICARBONATE RELATIONSHIPS

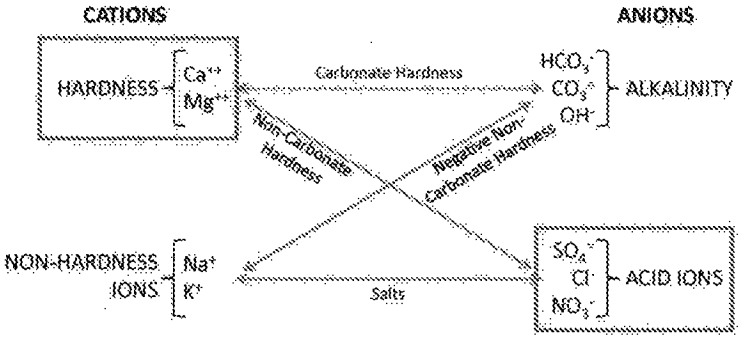
Hardness Combinations



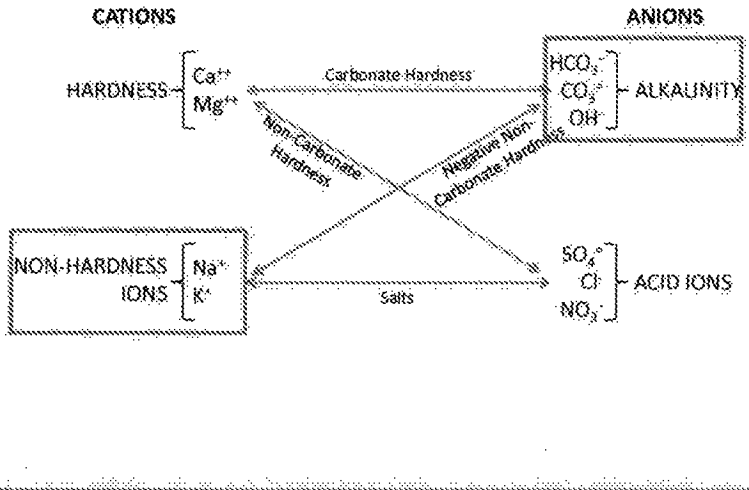
Hardness Combinations



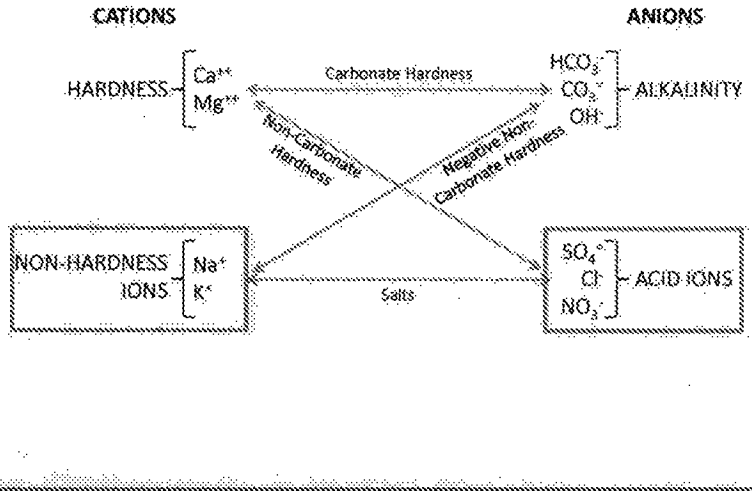
Hardness Combinations



Hardness Combinations

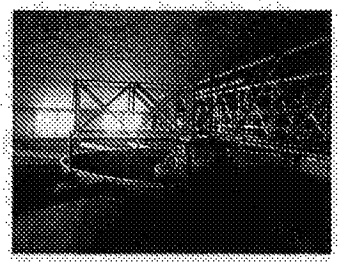


Hardness Combinations



Chemical Combinations

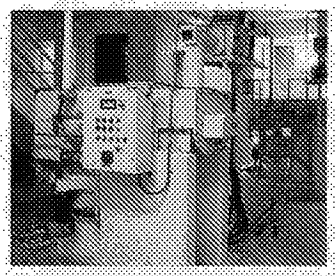
- Carbonate Hardness
  - Calcium Bicarbonate - $Ca(HCO_3)_2$
  - Magnesium Bicarbonate - $Mg(HCO_3)_2$
  - Calcium Carbonate - $CaCO_3$
  - Magnesium Carbonate - $MgCO_3$
- Noncarbonate Hardness
  - Calcium Sulfate – $CaSO_4$
  - Magnesium ~~Carbonate~~ Sulfate – $MgSO_4$
  - Calcium Chloride – $CaCl_2$
  - Magnesium Chloride – $MgCl_2$
- Negative Noncarbonate Hardness
  - Sodium Bicarbonate - $NaHCO_3$



Carbonate
Noncarbonate
Negative Non-carbonate

to remove hardness
Add hardness
to remove hardness

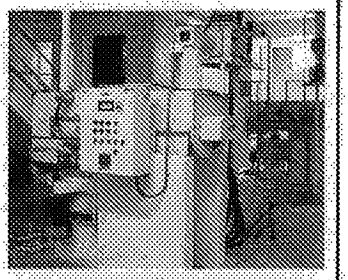
Chemical Softening Process



Add Hardness to Remove Hardness

Chemical Softening Process

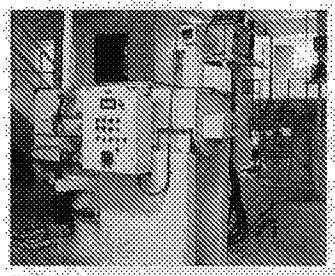
- Takes advantage of low solubilities of certain calcium and magnesium compounds to remove these cations from solution



Add Hardness to Remove Hardness

Chemical Softening Process

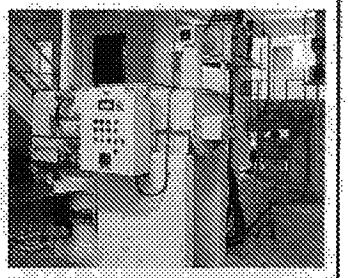
- Takes advantage of low solubilities of certain calcium and magnesium compounds to remove these cations from solution
- Calcium is precipitated as calcium carbonate by increasing the carbonate concentration above the solubility point



Add Hardness to Remove Hardness

Chemical Softening Process

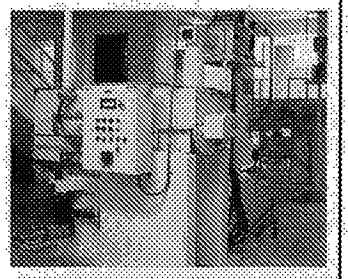
- Takes advantage of low solubilities of certain calcium and magnesium compounds to remove these cations from solution
- Calcium is precipitated as calcium carbonate by increasing the carbonate concentration above the solubility point
- Magnesium is precipitated by increasing the hydroxide concentration



Add Hardness to Remove Hardness

Chemical Softening Process

- Takes advantage of low solubilities of certain calcium and magnesium compounds to remove these cations from solution
- Calcium is precipitated as calcium carbonate by increasing the carbonate concentration above the solubility point
- Magnesium is precipitated by increasing the hydroxide concentration
- Calcium hydroxide - $Ca(OH)_2$ (hydrated lime)

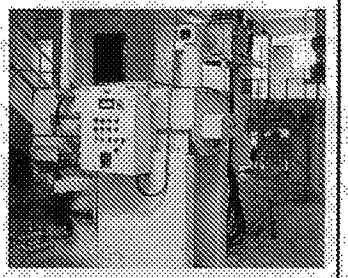


Add Hardness to Remove Hardness

pre to 5 Sulcomy CO2 - must neutralize
6 w hr nst
6 w 35 kg 50-60 mg/g → first
5 w 3 10 mg/e → Avoid

Chemical Softening Process

- Calcium Oxide - CaO (pebble, slake or quick lime)
- $CaO + H_2O \rightarrow Ca(OH)_2 + heat$



- Carbon Dioxide (CO_2)
  - Groundwater – 50 mg/l
  - Surface water - < 10 mg/l
  - $\log CO_2 = 6.338 + \log ALK(T) - pH$
  - $CO_2 + Ca(OH)_2 \rightarrow CaCO_3\downarrow + H_2O$

ADD HARDNESS TO REMOVE HARDNESS

Chemical Equations

- CARBONATE HARDNESS IS PRECIPITATED AS CALCIUM CARBONATE OR MAGNESIUM HYDROXIDE BY THE ADDITION OF LIME AS FOLLOWS:
  - $Ca(HCO_3)_2 + Ca(OH)_2 \rightarrow 2CaCO_3\downarrow + 2H_2O$
  - $Mg(HCO_3)_2 + 2Ca(OH)_2 \rightarrow 2CaCO_3\downarrow + Mg(OH)_2\downarrow + 2H_2O$
- NONCARBONATE CALCIUM HARDNESS IS PRECIPITATED AS CALCIUM CARBONATE BY THE ADDITION OF ~~[illegible]~~ soda ash FOLLOWS:
  - $CaSO_4 + Na_2CO_3 \rightarrow CaCO_3\downarrow + Na_2SO_4$

$CO_2 = 10^{(6.35 + \log Alk - pH)}$

Use on calc

10^x

Add H_2O 1 mL to 1 mL from CO_2

Chemical Equations

- NONCARBONATE MAGNESIUM HARDNESS IS PRECIPITATED AS MAGNESIUM HYDROXIDE BY THE ADDITION OF LIME WITH THE CONCURRENT PRODUCTION OF CALCIUM SULFATE, WHICH IN TURN IS PRECIPITATED AS CALCIUM CARBONATE WITH THE ADDITION OF SODA ASH AS FOLLOWS:

$$MgSO_4 + Ca(OH)_2 \rightarrow Mg(OH)_2\downarrow + CaSO_4$$

$$CaSO_4 + Na_2CO_3 \rightarrow CaCO_3\downarrow + Na_2SO_4$$

- Softened water is saturated with calcium carbonate and will have a high pH and must be stabilized prior to filtration. Is usually accomplished with carbon dioxide and is referred to as recarbonization:

$$CaCO_3 + CO_2 + H_2O \rightarrow Ca(HCO_3)_2$$

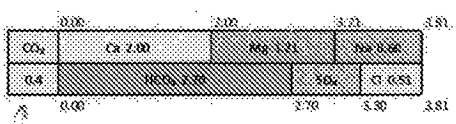
Softening Calculations

Water Analysis

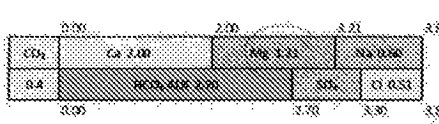
	CO_2	8.8	mg/l	Alk (T)	135	mg/l	as $CaCO_3$
cat	Ca^{++}	40	mg/l	Alk (F)	0	mg/l	as $CaCO_3$
cat	Mg^{++}	14.7	mg/l	SO_4	29	mg/l	
cat	Na^{+}	13.7	mg/l	Cl	17.8	mg/l	

Solution

		mg/l	×	Eq. Wt.	meq/l
	CO_2	8.8		22.0	0.40
cat	Ca^{++}	40		20.0	2.00
cat	Mg^{++}	14.7		12.2	1.21
cat	Na^{+}	13.7		23.0	0.60
an	Alk (T)	135		50.0	2.70
an	$SO_4^{=}$	29		48.0	0.60
an	Cl	17.8		35.5	0.51



Softening Calculations



Chemical Constituents

$Ca(HCO_3)_2$, $Mg(HCO_3)_2$, $MgSO_4$, Na_2SO_4, NaCl

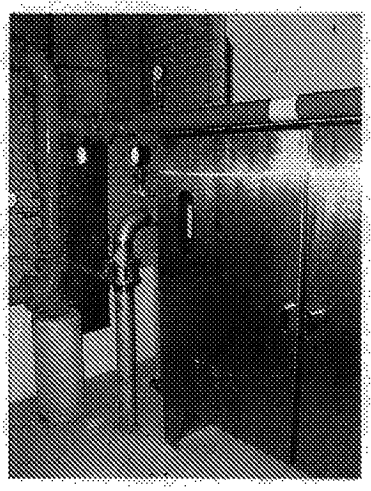
Calculate Lime/Soda Ash Requirements

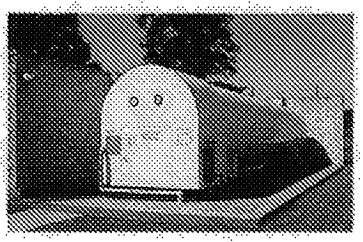
	mg/l	Lime meq/l	Soda Ash meq/l
CO_2	0.40	0.40	0.00
$Ca(HCO_3)_2$	2.00	2.00	0.00
$Mg(HCO_3)_2$	0.70	2.40	0.00
$MgSO_4$	0.50	0.51	0.51
Total meq/l		4.91	0.51

Lime Dosage = 4.91 + 0.10 = 5.01 meq/l @ 0.5 eq. wt. of CaO

Soda Ash Dosage = 0.51 + 0.10 = 0.61 meq/l @ 0.5 eq. wt. of Soda Ash

Recarbonation Process





CONTACT INFORMATION

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(630) 495-4199
jwgreen@lan-inc.com



Lockwood, Andrews & Newnam, Inc.

Spreadsheet for Flow rate for proper feed amts.

CHEMICAL SOFTENING CALCULATIONS

WATER QUALITY DATA			
Calcium (Ca)	93.0	mg/l as Ca	
Ca Hardness	232.5	mg/l as $CaCO_3$	Input
Magnesium (Mg)	14.5	mg/l as Mg	
Mg Hardness	59.7	mg/l as $CaCO_3$	
Total Hardness	292	mg/l as $CaCO_3$	
pH	8.0	units	
Alkalinity (T)	248.0	mg/l as $CaCO_3$	If Alk (P) = 0, Then Alk is HCO_3
Alkalinity (P)	0.0	mg/l as $CaCO_3$	
CO_2	5.4	mg/l	
Sodium (Na)	12.0	mg/l	
Sulfate (SO_4)	40.0	mg/l	
Chloride (Cl)	45	mg/l	

MILLIEQUIVALENT WEIGHTS

Parameter	Equiv. Wt.	meq/l	
CO_2	22.0	0.25	
Calcium (Ca)	20.0	4.65	
Magnesium (Mg)	12.2	1.19	OK QA/QC Check
Sodium (Na)	23.0	0.52	
Alkalinity (T)	50.1	4.95	
Sulfate (SO_4)	48.0	0.83	
Chloride (Cl)	35.0	1.29	

HYPOTHETICAL COMBINATIONS

Parameter	meq/l	Lime meq/l	Soda Ash meq/l	Hardness as $CaCO_3$
CO_2	0.25	0.25	0.00	
$Ca(HCO_3)_2$	4.65	4.65	0.00	233
$Mg(HCO_3)_2$	0.30	0.60	0.00	15
$MgSO_4$	0.89	0.89	0.89	45
Total	6.08	6.38	0.89	293

Chemical Dosage Requirements

Chemical		Assume softening to 30 mg/l of CO_3 as $CaCO_3$ and 10 mg/l of OH as $CaCO_3$
Pebble Lime	209 mg/l	Includes 30 mg/l of excess
Soda Ash	47 mg/l	
Carbon Dioxide	37 mg/l	

Sludge Production from Clarifier

Reaction	meq/l	Precipitate Produced CO_3 meq/l as $CaCO_3$	Precipitate Produced OH meq/l as $CaCO_3$
CO_2	0.25	0.25	0
$Ca(HCO_3)_2$	4.65	9.30	0
$Mg(HCO_3)_2$	0.30	0.60	0.30
$MgSO_4$	0.89	0.89	0.89
Excess Lime	1.25	1.25	0
	Total meq/l	12.28	1.19
	Less Practical Limits meq/l	0.60	0.20
	Precipitate Produced meq/l	11.68	0.99
	Precipitate Produced mg/l	584	49
	Precipitate Produced #/MG	4872	412
	Total #/MG	5284	

WTP Flow (MGD)	14	27
Dry Sludge Production in #/day	73,983	142,681
@ 4% Solids (gals/day)	221,771	427,701
@ 12% Solids (gals/day)	73,924	142,567
@ 12% Solids (gals/week)	517,466	997,970
Thickener Volume (cf)	69,180	
Number of Thickeners	2	
Volume per Thickener (cf)	34,590	
Use Volume per Thickener (cf)	35,000	
Thickener SWD (ft)	25	
Thickener Diameter (ft)	42	

Dry Sludge Production (tons/week)	259	SG $CaCO_3$	2.71
Number of Hours per Week to Press	48	SG $Mg(OH)_2$	2.36
Dry Sludge Processed (#/hr)	10,789	SG solids	2.68
@ 55% Solids Sludge Processed (#/hr)	19,617		
55% Solids Sludge (#/cy)	2571	Sludge Solids =	55% as $CaCO_3$
@ 55% Solids Sludge Processed (cf/hr)	206	Sludge Unit Wt. =	95.22 pcf

Table of Hydroxide, Carbonate & Bicarbonate Alkalinity Relationships			
Result of Titration	Hydroxide (OH) as	Carbonate (CO_3) as	Bicarbonate (HCO_3)
P = 0	0	0	T
P < 1/2 T	0	2 P	T-2 P
P = 1/2 T	0	2 P	0
P > 1/2 T	2 P - T	2(T - P)	0
P = T	T	0	0
KEY: P = phenolphthalein alkalinity; T = total alkalinity			

Chemical Elements and Compounds, Formula, Molecular and Equivalent Weight, and $CaCO_3$ Equivalent

Substance	Formula	Atomic or Mol. Weight	Equivalent Weight	Multiplying Factor (considering molecular weight of $CaCO_3$ as 100): Substance to $CaCO_3$ Equivalent	Multiplying Factor (considering molecular weight of $CaCO_3$ as 100): $CaCO_3$ Equivalent to Substance
Aluminum	Al	27.0	9.0	5.55	0.18
Aluminum Sulfate	$Al_2(SO_4)_3 \cdot 18H_2O$	666.4	111.1	0.45	2.22
Aluminum Sulfate	$Al_2(SO_4)_3$ anhydrous	342.1	57.0	0.88	1.14
Ammonia	NH	17.0	17.0	2.94	0.34
Ammonium (Iron)	NH_4	18.0	18.0	2.78	0.36
Calcium	Ca	40.1	20.0	2.50	0.40
Calcium Bicarbonate	$Ca(HCO_3)_2$	162.1	81.1	0.62	1.62
Calcium Carbonate	$CaCO_3$	100.08	50.1	1.00	1.00
Calcium Chloride	$CaCl_2$	111.0	55.5	0.90	1.11
Calcium Hydrate	$Ca(OH)_2$	74.1	37.1	1.35	0.74
Calcium Hypochlorite	$Ca(ClO)_2$	143.1	35.8	0.70	1.43
Calcium Oxide	CaO	56.1	28.0	1.79	0.56
Calcium Sulfate	$CaSO_4 \cdot 2H_2$ (gypsum)	172.2	86.1	0.58	1.72
Carbon	C	12.0	3.0	16.67	0.06
Chlorine	Cl	35.5	35.5	1.41	0.71
Copper (Cupric)	Cu	63.6	31.8	1.57	0.64
Copper Sulfate (Cupric)	$CuSO_4$	160.0	80.0	0.68	1.60
Copper Sulfate (Cupric)	$CuSO_4 \cdot 5H_2O$	250.0	125.0	0.40	2.50
Iron (Ferrous)	Fe^{++}	55.8	27.9	1.79	0.56
Iron (Ferric)	Fe^{+++}	55.8	18.6	2.69	0.37
Ferrous Hydroxide	$Fe(OH)_3$	89.9	44.9	1.11	0.90
Fluorine	F	19.0	19.0	2.66	0.38
Hydrogen (Ion)	H	1.01	1.01	50.00	0.02
Hypochlorous Acid	HOCl	52.5	52.5	0.95	1.05
Iodine	I	127.0	127.0	0.40	2.54
Lead	Pb	207.0	104.0	0.48	2.08
Magnesium	Mg	24.3	12.2	4.12	0.24
Magnesium Oxide	MgO	40.3	20.2	2.48	0.40
Magnesium Bicarbonate	$Mg(HCO_3)_2$	146.3	73.2	0.68	1.46
Magnesium Carbonate	$MgCO_3$	84.3	42.2	1.19	0.84
Manganese (Manganous)	Mn^{++}	54.9	27.5	1.82	0.55
Manganese (Manganic)	Mn^{+++}	54.9	18.3	2.73	0.37
Nitrogen	N	14.0	(varies)	(varies)	(varies)
Oxygen	O	16.0	8.0	6.25	0.16
Potassium	K	39.1	39.1	1.28	0.78
Sodium	Na	23.0	23.0	2.18	0.46
Sodium Bicarbonate	$NaHCO_3$	84.0	84.0	0.60	1.68
Sodium Carbonate	Na_2CO_3	106.0	53.0	0.94	1.06
Sodium Carbonate	$Na_2CO_3 \cdot 10H_2O$	286.0	143.0	0.35	2.86
Sodium Chloride	CaCl	58.5	58.5	0.85	1.17
Sodium Floride	NaF	42.0	42.0	1.19	0.84
Sodium Hyochlorite	NaClO	74.5	37.3	0.67	1.49
Sulfur	S	32.1	(varies)	(varies)	(varies)
Bicarbonate (Ion)	HCO_3	61.0	61.0	0.82	1.22
Carbonate (Ion)	CO_3	60.0	30.0	1.67	0.60
Carbon Dioxide	CO_2	44.0	22.0	1.14	0.88

Common elements & radicals

Table 2-1. Basic Information on Common Elements

Name	Symbol	Atomic Weight	Common Valence	Equivalent Weight*
Aluminum	Al	27.0	3+	9.0
Arsenic	As	74.9	3+	25.0
Barium	Ba	137.3	2+	68.7
Boron	B	10.8	3+	3.6
Bromine	Br	79.9	1−	79.9
Cadmium	Cd	112.4	2+	56.2
Calcium	Ca	40.1	2+	20.0
Carbon	C	12.0	4−	
Chlorine	Cl	35.5	1−	35.5
Chromium	Cr	52.0	3+	17.3
			6+	
Copper	Cu	63.5	2+	31.8
Fluorine	F	19.0	1−	19.0
Hydrogen	H	1.0	1+	1.0
Iodine	I	126.9	1−	126.9
Iron	Fe	55.8	2+	27.9
			3+	
Lead	Pb	207.2	2+	103.6
Magnesium	Mg	24.3	2+	12.2
Manganese	Mn	54.9	2+	27.5
			4+	
			7+	
Mercury	Hg	200.6	2+	100.3
Nickel	Ni	58.7	2+	29.4
Nitrogen	N	14.0	3−	
			5+	
Oxygen	O	16.0	2−	8.0
Phosphorus	P	31.0	5+	6.0
Potassium	K	39.1	1+	39.1
Selenium	Se	79.0	6+	13.1
Silicon	Si	28.1	4+	6.5
Silver	Ag	107.9	1+	107.9
Sodium	Na	23.0	1+	23.0
Sulphur	S	32.1	2−	16.0
Zinc	Zn	65.4	2+	32.7

* Equivalent weight (combining weight) equals atomic weight divided by valence.

Table 2-2. Common Radicals Encountered in Water

Name	Formula	Molecular Weight	Electrical Charge	Equivalent Weight
Ammonium	NH_4^+	18.0	1+	18.0
Hydroxyl	OH^-	17.0	1−	17.0
Bicarbonate	HCO_3^-	61.0	1−	61.0
Carbonate	CO_3^{--}	60.0	2−	30.0
Orthophosphate	PO_4^{---}	95.0	3−	31.7
Orthophosphate, mono-hydrogen	HPO_4^{--}	96.0	2−	48.0
Orthophosphate, di-hydrogen	$H_2PO_4^-$	97.0	1−	97.0
Bisulfate	HSO_4^-	97.0	1−	97.0
Sulfate	SO_4^{--}	96.0	2−	48.0
Bisulfite	HSO_3^-	81.0	1−	81.0
Sulfite	SO_3^{--}	80.0	2−	40.0
Nitrite	NO_2^-	46.0	1−	46.0
Nitrate	NO_3^-	62.0	1−	62.0
Hypochlorite	OCl^-	51.5	1−	51.5

Eqns

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY

$CO_2 + Ca(OH)_2 \rightarrow CaCO_3 \downarrow + H_2O$

$Ca(HCO_3)_2 + Ca(OH)_2 \rightarrow 2CaCO_3 \downarrow + 2H_2O$

$Mg(HCO_3)_2 + Ca(OH)_2 \rightarrow CaCO_3 \downarrow + MgCO_3 + 2H_2O$

$MgCO_3 + Ca(OH)_2 \rightarrow Mg(OH)_2 \downarrow + CaCO_3$

$MgSO_4 + Ca(OH)_2 \rightarrow Mg(OH)_2 \downarrow + CaSO_4$

$CaSO_4 + Na_2CO_3 \rightarrow CaCO_3 \downarrow + Na_2SO_4$

$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

$CaCO_3 + CO_2 + H_2O \rightarrow Ca(HCO_3)_2$

30 mg/l $CaCO_3$ ≈ 10 mg/l $Mg(OH)_2$

Mg. Hardness < 40 mg/l as $CaCO_3$

$CaO + H_2O \rightarrow Ca(OH)_2 + heat$

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY

Amounts of CaO (90%) & Soda Ash (98%) to remove 100 mg/l of Hardness from 1 MGo of Water

$Ca(HCO_3)_2$ - 520 # Lime

$Mg(HCO_3)_2$ - 1040 # Lime

Ca (Non-Carbonate) - 900 # Soda Ash

Mg Non-Carb - 900 # Soda Ash
520 # Lime

As $CaCO_3$

mg/l Ca × 2.497 (2.5)

mg/l Mg × 4.12

For Each mg/l CO_2 use $\frac{0.015 \# Ca(OH)_2}{1000 gals}$

$\frac{0.0118 \# CaO}{1000 gals}$

www.lan-inc.com

textbook softening CAL → purely theoretical

ALVORD, BURDICK & HOWSON
ENGINEERS - CHICAGO

BY JWG SUBJECT Lime - Soda Soft DATE Aug 95

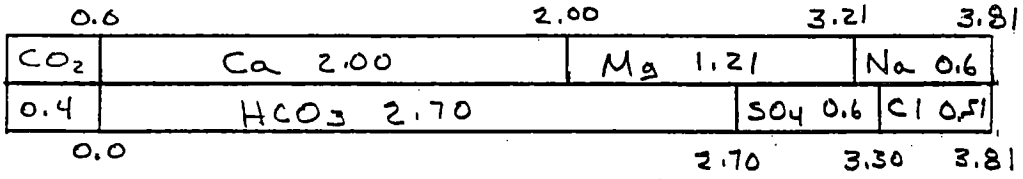
Water Softening Example

Lab Analysis

CO_2 = 8.8 mg/l
Ca = 40 mg/l
Mg = 14.7 mg/l
Na = 13.7 mg/l
Alk (HCO_3) = 135 mg/l ($CaCO_3$)
SO_4 = 29 mg/l
Cl = 17.8 mg/l

Solution

	mg/l	Eq. wt.	meq/l
CO_2	8.8	22.0	0.40
Ca	40.0	20.0	2.00
Mg	14.7	12.2	1.21
Na	13.7	23.0	0.60
Alk	135	50.0	2.70
SO_4	29	48.0	0.60
Cl	17.8	35.0	0.51



Possible Combinations

$Ca(HCO_3)_2$, $Mg(HCO_3)_2$, $MgSO_4$, Na_2SO_4, NaCl

Calculate Lime / Soda Ash Requirments

	meq/l	Lime meq/l	Soda Ash meq/l
CO_2	0.4	0.40	0
$Ca(HCO_3)_2$	2.00	2.00	0
$Mg(HCO_3)_2$	0.70	1.40	0
$Mg(SO_4)$	0.51	0.51	0.51
		4.31	0.51

Lime Dosage = 4.31 x 28 + 30* = 151 mg/l
Soda Ash = 0.51 x 53 = 27 mg/l

Prysby, Mike (DEQ)

From: Prysby, Mike (DEQ)
Sent: Monday, June 25, 2012 2:19 PM
To: Hall, Ben (DEQ)
Cc: Lee, Lonnie (DEQ); Shekter Smith, Liane (DEQ); Browne, Elizabeth (DEQ)
Subject: RE: Director's visit to Flint

Ben ,

The Flint WTP is a 36 million gallon per day (MGD) facility (Flint River source) that underwent a $45 million rehabilitation project (completed in 2005) that allows the plant to function as an emergency back-up water supply for the city of Flint and Genesee County. The WTP is not operated on a routine basis ; however, the facility would be placed into emergency operation in the event that the single pipeline serving Flint (72-inch transmission main) from the Detroit Water & Sewerage Department (DWSD) were to fail. The MDEQ requires the city of Flint to conduct quarterly test runs to demonstrate that the WTP remains capable of producing treated water that meets the drinking water standards. The WTP will be conducting one of these test runs during the visit on June 29th.

The city is currently faced with the challenge of determining their future source of drinking water. Yearly wholesale rate increases from DWSD is making it increasingly more difficult for the city and its residents to afford the cost of water. Flint's long-term choices include the ability to fully utilize the WTP through blending treated water from the Flint River with water either purchased from DWSD or from Lake Huron through the Karegnondi Water Authority (KWA). The MDEQ does not object to the option of blending treated water; however, additional infrastructure will be needed at the Flint WTP. Finally, Flint would also have to "buy-in" to the KWA if they wish to purchase Lake Huron water for treatment.

The city is very aware of the need to commit to a new source of drinking water; however, given their current financial situation, it does not appear that the city can move forward towards establishing any binding commitments. It is possible that officials from city administration may attend the WTP tour and take the opportunity to express this concern with the Director.

Finally, the Flint WTP was placed into emergency operation in 2009 to mitigate two separate pipeline emergencies. The ability of the stand-by WTP to produce potable drinking water during these two events prevented a region-wide water emergency and maintained public health protection for over 100,000 people.

Finally – here's the address: 4500 North Dort Highway
Flint, Michigan 48505

Michael Prysby, P.E.
Acting District Supervisor
RMD, MDEQ
335-6122

From: Hall, Ben (DEQ)
Sent: Monday, June 25, 2012 10:56 AM
To: Prysby, Mike (DEQ)
Subject: RE: Director's visit to Flint

Ok I need to pass on to the Director a short paragraph on this Facility along with the address. Also he would like a limited number of people on the visits.

Ben Hall

May 10, 2012

I received a media inquiry from Ms. Kristen Longley from the Flint Journal concerning the city of Flint and the direction(s) that they are investigating for their future source of drinking water. A summary of our discussion is provided below.

Q1. Have you been in contact or involved in discussions with the city of Flint concerning their future direction for drinking water?

A: Staff from the MDEQ and myself have been involved in several discussions with the city concerning this issue.

Q2: The city of Flint is considering various options for the blending of water. Does the DEQ support the blending of water?

A: The blending of treated water from the Flint WTP with water purchased from Detroit is a feasible option and would be allowed by the DEQ provided that the finished water quality distributed to the city Flint is comparable to the water currently purchased from Detroit.

Q3: Would it be feasible and/or ideal from the DEQ's standpoint for the city of Flint to blend up to three sources of water: Flint River, water from Detroit and water from the proposed KWA pipeline from Lake Huron?

A: It would be feasible to treat raw water from 2 sources and blend that one component of treated water from the Flint WTP with finished water purchased from Detroit ....again... provided that water which is distributed to the city of Flint is comparable in quality to the water currently purchased from Detroit.

Q4: How likely is it that the finished water quality will be acceptable?

A: The DEQ is confident that the Flint WTP can meet drinking water standards based on the degree of treatment at the WTP. The WTP has also demonstrated the ability to treat Flint River water (as a sole source) during emergency operation and yet maintain primary drinking water standards.

Q5: Is the DEQ concerned about the capacity of the Flint River?

A: Capacity of the Flint River could pose some concern if the city were to utilize the Flint River as it sole source. As the component of use of the Flint River decreases with increasing use of KWA and/or Detroit water, available source capacity will be less of a concern.

Q6: What regulatory role do you have with the city of Flint?

A: I have regulatory oversight of the Michigan Safe Drinking Water Act and Rules as it pertains to public water supplies, including the city of Flint.

End of inquiry

MEMORANDUM

DATE: November 7, 2011
TO: Liane Shekter Smith, John F. O'Brien, and David Jansen
FROM: John C. O'Malia, P.E.
SUBJECT: Response to MDEQ Email to John O'Brien dated October 10, 2011

I have discussed the referenced email with Genesee County Division of Water and Waste Services' staff and wish to confirm the following:

1. County elections are Tuesday, November 8, 2011,

2. Karegnondi Water Authority (KWA) should be able to finalize contracts with potential members by the end of December. This will define the project size in that each member will select their flow contract amount. This will then define the actual project size versus what was proposed in the Lake Huron Water Supply Study Report dated 2009,

3. The finalization of items 1 and 2 above should allow KWA to then define the project size by the end of December 2011,

4. With the project defined, scheduling a meeting with MDEQ staff in early January 2012 would be appropriate,

5. There have been discussions with City of Detroit DWSD, on many technical issues regarding utilizing/purchasing some of the DWSD physical facilities. Although technical progress is being made, any purchasing of physical assets will have to be approved by DWSD and City Council. So, final agreement is sometime in the future and, that again, could impact project size, scope and schedule,

6. At the MDEQ meeting, we can fully inform you and staff of the DWSD discussions and how the impact on the project size and scope. If an agreement is reached regarding DWSD assets, this will impact final design. However, the 2009 Lake Huron Study must be updated once the project size is known. Therefore, the study will be updated and ready for review approximately six months after community contracts for volume are signed.

7. It is likely that the KWA project could move quickly into design. That being the case, we wish to work closely with MDEQ to keep communications open with timely meetings to resolve issues and eliminate long review times. We recognize the project size and substantial effort required by all, so it is our intent to minimize conflicts and resolve issues quickly to move the project forward,

8. We also recognize the diversity of project physical location(s). That impacts MDEQ review staff location(s) and we will be sensitive to that issue. This will also be a topic we wish to discuss in our meeting with you and staff.

We appreciate your interest in defining the KWA Project. We also look forward to resolving Project Scope and Schedule and will keep you informed on progress as it evolves.

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

August 13, 2012

Not covered in permit

Mr. John F. O'Brien, P.E., Director
Genesee County Drain Commission
Division of Water and Waste Services
G-4610 Beecher Road
Flint, Michigan 48532-2617

Lang. in secondary Allo. taking via Lk. Erie watershed → construct a diversion

Violates Commingling use criteria

Dear Mr. O'Brien:

SUBJECT: Water Withdrawal Permit Number 2009-001

This is in response to your May 14, 2012, request to modify Genesee County's large quantity water withdrawal permit number 2009-001. The permit to withdraw up to 85 million gallons of water per day for a community public water supply was issued on August 28, 2009, under the provisions of Part 327, Great Lakes Preservation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

The requested changes to the permit include the relocation of intake cribs from approximately 3 miles offshore to 1.5 miles offshore, and the reduction in diameter of the intake line from 96 inches to 72 inches.

The requested design and construction changes do not alter the determination made by the Department of Environmental Quality (DEQ) during its review of the original water withdrawal permit application. In addition, public comments received, and consultation with the Great Lakes states and provinces did not raise any concerns about the requested changes. A revised permit indicating the new location of the intake cribs is enclosed.

If you have any questions regarding this correspondence or permit, or if there are any additional changes proposed to your project as described in the original permit application materials, please contact Mr. Andrew LeBaron, Surface Water Assessment Section, Water Resources Division, at 517-241-1435; or you may contact me.

Ag. is a consumptive use
Use is not covered by G.L. Not in our Pol. water is

Sincerely,

Diana Klemans (for D. Klemans)

Diana Klemans, Chief
Surface Water Assessment Section
Water Resources Division
517-335-4121

Enclosure

cc/enc: Mr. Brian Rudolph, Saginaw Bay District Supervisor, DEQ
Ms. Lynelle Maroff, Office of the Great Lakes, DEQ
Ms. Liane Shekter Smith, Chief, Resource Management Division, DEQ
Mr. Brant Fisher, Resource Management Division, DEQ
Mr. William Creal, Chief, Water Resources Division, DEQ
Mr. Andrew LeBaron, Water Resources Division, DEQ

DEQ

Department of Environmental Quality, Water Resources Division

REVISED LARGE QUANTITY WATER WITHDRAWAL PERMIT

Issued under Part 327
Great Lakes Preservation, of the Natural Resources and Environmental Protection Act
1994 PA 451, as amended

In accordance with Part 327, Great Lakes Preservation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), authority is hereby given to withdraw water from the waters of the State of Michigan as described herein. This permit is issued in reliance on information supplied in the corresponding application and other information as may have been supplied by the permit applicant in support of that application.

PERMIT NUMBER: 2009-001

DATE ISSUED: August 28, 2009
DATE REVISED: August 14, 2012

Permittee Name and Address: Genesee County Drain Commission
Division of Water and Waste Services
G-4610 Beecher Road
Flint, Michigan 48532

Location Information

County where Water Withdrawal is Located: Sanilac County
Township Name, Town, Range, and Section: Worth Township, T9N, R17E, Sections 31 and 32

The activity authorized by this permit is subject to the following limitations and conditions:

Section A. Authorizations and Coverage Provisions

1. **Water Withdrawal is restricted to the following sources, locations, and rates above the baseline capacity established with the DEQ:**

Water Withdrawal Source	Latitude and Longitude (decimal degrees)	Withdrawal Rate
Lake Huron	43.1724; -82.4827	85 million gallons per day / 59,028 gallons per minute

2. **Approval Conditions**

a) The Genesee County Drain Commission must require as a condition of this authorization that all participating members of the Karegnondi Water Authority certify compliance with the environmentally sound and economically feasible water conservation measures applicable to the water user's sector under Section 32708a of Part 327 and posted on the DEQ Web site prior to commencing with the construction of any facilities necessary to implementation of the withdrawal. Certification shall be provided to Ms. Diana Klemans, Chief, Surface Water Assessment Section, at klemansd@michigan.gov; or DEQ, P.O. Box 30458, Lansing, Michigan 48909-7958.

b) A permit under the Safe Drinking Water Act, 1976 PA 399, as amended (Act 399), and rules, must be obtained prior to commencing with the construction of any facilities necessary to implementation of the withdrawal.

Section B. Reporting and Record Keeping

1. Environmental Impacts

The permittee is required to immediately contact Mr. Brian Rudolph, Saginaw Bay District Supervisor, at 989-894-6225 if an Adverse Resource Impact (ARI) occurs in association with the water withdrawal authorized by this permit. An ARI is defined in Section 32701(1)(a)(vii) of Part 327 as "Decreasing the level of a lake or pond with a surface area of 5 acres or more through a direct withdrawal from the lake or pond in a manner that would impair or destroy the lake or pond or the uses made of the lake or pond, including the ability of the lake or pond to support characteristic fish populations, or such that the ability of the lake or pond to support characteristic fish populations is functionally impaired."

2. Water Use Report

Water Use Reporting for a Public Water Supply is implemented through the annual reporting required under Act 399.

Section C. Liability

1. Noncompliance

Commencing the water withdrawal authorized herein confirms the permittee's acceptance and agreement to comply with all terms and conditions of this permit. Noncompliance with these terms and conditions, and/or the initiation of other regulated activities not specifically authorized by this permit, shall be cause for the modification, suspension, or revocation of this permit, in whole or, in part. Further, the DEQ may initiate criminal and/or civil proceedings to correct deficiencies, protect natural resource values, and secure compliance with law.

2. Limitations

This permit does not convey property rights in water or other real or personal property, authorize any injury to private property or invasion of public or private rights, or waive the necessity of obtaining any other applicable federal, state, or local permit or approval.

3. Indemnification

The permittee shall indemnify and hold harmless the State of Michigan and its departments, agencies, officials, employees, agents, and representatives for any and all claims or causes of action arising from acts or omissions of the permittee, or employees, agents, or representatives of the permittee, undertaken in connection with this permit. This permit shall not be construed as an indemnity by the State of Michigan for the benefit of the permittee or any other person.

Dan Wyant, Director
Department of Environmental Quality

Dennis Bush (For D. Klemans) August 14, 2012

Diana Klemans, Chief
Surface Water Assessment Section
Water Resources Division
517-335-4121

Date

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

PERMIT APPLICATION FOR WATER SUPPLY SYSTEMS

(CONSTRUCTION - ALTERATION - ADDITION OR IMPROVEMENT) AS DESCRIBED HEREIN

Required under the Authority of 1976 PA 399, as amended

This application becomes an Act 399 Permit only when signed and issued by authorized Michigan Department of Environmental Quality (DEQ) Staff. See instructions below for completion of this application.

1. **Municipality or Organization, Address and WSSN** that will own or control the water facilities to be constructed. This permit is to be issued to: Genesee County Drain Commissioner Division of Water and Waste Services G-4610 Beecher Road Flint, MI 48532 **WSSN:** 02615	Permit Stamp Area (DEQ use only) MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY PERMIT NO. W 122056 AUG 21 '12 SLA EXAMINED AND APPROVED FOR COMPLIANCE WITH ACT 399, P.A. 1976	
2. **Owner's Contact Person** (provide name for questions): Contact: John O'Brien, PE Title: Director Phone: (810) 732-7870		
3. **Project Name** (Provide phase number if project is segmented): Lake Huron Water Supply Initiative Contract S-4000 Water Supply Intake	4. **Project Location** (City, Village, Township): Worth Township	5. **County** (location of project): Sanilac

ISSUED UNDER THE AUTHORITY OF THE DIRECTOR OF THE DEPARTMENT OF ENVIRONMENT QUALITY

cc:

Issued by: Stephen Hoffard, P.E.

Reviewed by: Stephen Hoffard, P.E.

☐ **If this box is marked see attached special conditions.**

Instructions: Complete items 1 through 5 above and 6 through 21 on the following pages of this application. Print or type all information except for signatures. Mail completed application, plans and specifications, and any attachments to the DEQ District Office having jurisdiction in the area of the proposed construction.

Please Note:

a. This **PERMIT** only authorizes the construction, alteration, addition or improvement of the water system described herein and is issued solely under the authority of 1976 PA 399, as amended.
b. The issuance of this **PERMIT** does not authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other DEQ permits, or approvals from other units of government as may be required by law.
c. This **PERMIT** expires two (2) years after the date of issuance in accordance with R 325.11306, 1976 PA 399, administrative rules, unless construction has been initiated prior to expiration.
d. Noncompliance with the conditions of this permit and the requirements of the Act constitutes a violation of the Act.
e. Applicant must give notice to public utilities in accordance with 1974 PA 53, (MISS DIG), being Section 460.701 to 460.718 of the Michigan Compiled Laws, and comply with each of the requirements of that Act.
f. All earth changing activities must be conducted in accordance with the requirements of the Soil Erosion and Sedimentation Control Act, Part 91, 1994 PA 451, as amended.
g. All construction activity impacting wetlands must be conducted in accordance with the Wetland Protection Act, Part 303, 1994 PA 451, as amended.
h. Intentionally providing false information in this application constitutes fraud which is punishable by fine and/or imprisonment.
i. Where applicable for water withdrawals, the issuance of this permit indicates compliance with the requirements of Part 327 of Act 451, Great Lakes Preservation Act.

6. **Facilities Description** – In the space below provide a detailed description of the proposed project. Applications without adequate facilities descriptions **will be returned.** SEE EXAMPLES BELOW. Use additional sheets if needed.

78" water supply intake extending approximately one mile into Lake Huron. Two timber intake cribs are included on the intake pipline. The intake pipline is designed to provide a capacity of 85 mgd. Each intake crib has a capacity of 60 mgd. Chemical piping is provided to supply a chlorine solution to diffusers in each intake crib for zebra mussel control. A 30-foot diameter concrete junction chamber is located approximately 200' west of M-25 and 1,000' north of Fisher Road. The west end of the intake pipeline is located at the junction chamber. A valve is provided in the junction chamber on the intake pipeline.

EXAMPLES – EXAMPLES – EXAMPLES – EXAMPLES – EXAMPLES – EXAMPLES	
Water Mains	500 feet of 8-inch water main in First Street from Main Street north to State Street. OR 250 feet of 12-inch water main in Clark Road from an existing 8-inch main in Third Avenue north to a hydrant.
Booster Stations	A booster station located at the southwest corner of Third Avenue and Main Street, and equipped with two, 15 Hp pumps each rated 150 gpm @ 200 feet TDH. Station includes backup power and all other equipment as required for proper operation.
Elevated Storage Tank	A 300,000 gallon elevated storage tank located in City Park. The proposed tank shall be spherical, all welded construction and supported on a single pedestal. The tank shall be 150 feet in height, 40 feet in diameter with a normal operating range of 130 – 145 feet. The interior coating system shall be ANSI/NSF Standard 61 approved or equivalent. The tank will be equipped with a cathodic protection system, and includes a tank level control system with telemetry.
Chemical Feed	A positive displacement chemical feed pump, rated at 24 gpd @ 110 psi to apply a chlorine solution for Well No. 1. Chlorine is 12.5% NaOCL, ANSI/NSF Standard 60 approved and will be applied at a rate of 1.0 mg/l of actual chlorine.
Water Supply Well	Well No. 3, a 200 foot deep well with 170 feet of 8-inch casing and 30 feet of 8-inch, 10 slot screen. The well will be equipped with a 20 Hp submersible pump and motor rated 200 gpm @ 225 feet TDH, set at 160 feet below land surface.
Treatment Facilities	A 5 million gpd water treatment plant located at the north end of Second Avenue. The facility will include 6 low service pumps, 2 rapid mix basins, 4 flocculation/sedimentation basins, 8 dual media filters, 3 million gallon water storage reservoir and 6 high service pumps. Also included are chemical feed pumps and related appurtenances for the addition of alum, fluoride, phosphate and chlorine.

General Project Information – Complete all boxes below.

7. Design engineer's name, engineering firm, address, phone number, and email address:

James E. Redding, PE
ROWE Professional Services Company
PO Box 3748, Flint, MI 48502
(810) 341-7500

8. Indicate who will provide project construction inspection:
☐Organization listed in Box 1.
☒Engineering firm listed in Box 7.
☐Other - name, address, and phone number listed below.

9. Is a basis of design attached?
☒YES ☐NO

If no, briefly explain why a basis of design is not needed.

10. Are sealed and signed engineering plans attached?
☒YES ☐NO

If no, briefly explain why engineering plans are not needed.

11. Are sealed and signed construction specifications attached?
☒YES ☐NO

If specifications are not attached, they need to be on file at DEQ.

12. Were Recommended Standards for Water Works, Suggested Practice for Water Works, AWWA guidelines, and the requirements of Act 399 and its administrative rules followed?
☒YES ☐NO

If no, explain which deviations were made and why.

13. Are all coatings, chemical additives and construction materials ANSI/NSF or other adequate 3rd party approved?
☒YES ☐NO

If no, describe what coatings, additives or materials did not meet the applicable standard and why.

14. Are all water system facilities being installed in the public right-of-way or a dedicated utility easement? (For projects not located in the public right-of-way, utility easements must be shown on the plans.)
☐YES ☒NO

If no, explain how access will be obtained. Improvements are on property under ownership of Genesee County, M-25 ROW, and bottom land easement to be granted by the state.

15. Is the project construction activity within a wetland (as defined by Section 324.30301(d)) of Part 303, 1994 PA 451?
☐YES ☒NO

If yes, a wetland permit must be obtained.

16. Is the project construction activity within a 100-year floodplain (as defined by R 323.1311(e)) of Part 31, 1994 PA 451, administrative rules?
☐YES ☒NO

If yes, a flood plain permit must be obtained.

17. Is the project construction activity within 500 feet of a lake, reservoir, or stream?
☒YES ☐NO

If yes, a Soil and Erosion Control Permit must be obtained or indicate if the owner listed in box 2 of this application is an Authorized Public Agency (Section 10 of Part 91, 1994 PA 451) ☐ Owner is APA.

18. Will the proposed construction activity be part of a project involving the disturbance of five (5) or more acres of land?
☒YES ☐NO
If yes, is this activity regulated by the National Pollutant Discharge Elimination System storm water regulations?
☒YES: NPDES Authorization to discharge storm water from construction activities must be obtained.

☐NO: Describe why activity is not regulated:
Please call 517-241-8993 with questions regarding the applicability of the storm water regulations.

19. Is the project in or adjacent to a site of suspected or known soil or groundwater contamination?
☐YES ☒NO

If yes, attach a copy of a plan acceptable to the DEQ for handling contaminated soils and/or groundwater disturbed during construction. Contact the local DEQ district office for listings of Michigan sites of environmental contamination.

20. IF YOU ARE A CUSTOMER/WHOLESALE/BULK PURCHASER, COMPLETE THE FOLLOWING

1) Name and WSSN of source water supply system (seller) 01800

2) Does the water service contract require water producer/seller to review and approve customer/wholesale/bulk purchaser water system construction plans?
☐YES ☒NO

If yes to #2, the producer/seller approval letter must be attached when submitted to DEQ.

21. **Owner's Certification** The owner of the proposed facilities or the owner's authorized representative shall complete the owner's certification. It is anticipated that the owner will either be a governmental agency (city, village, township, county, etc.) or a private owner (individual, company, association, etc.) of a Type I public water supply.

OWNER'S CERTIFICATION

I, JEFF WRIGHT (print) (name), acting as the AGENT (print) (title/position) for DIVISION OF WATER & WASTE SERVICE (print) (entity owning proposed facilities) certify that this project has been reviewed and approved as detailed by the Plans and Specifications submitted under this application, and is in compliance with the requirements of 1976 PA 399, as amended, and its administrative rules.

Signature* 8-17-12 Date 810-732-1590 Phone

*Original signature only, no photocopies will be accepted.

GENESEE COUNTY DRAIN COMMISSIONER
DIVISION OF WATER & WASTE SERVICES

INTAKE BASIS OF DESIGN
6/29/12

A. Intake General
   1. Single intake pipe
   2. Two cribs spaced approximately 2200' apart, with first crib 3375' off shore
   3. Each crib designed for 60 mgd with future 85 mgd to be considered
   4. Crib 1 location lake bottom elevation = 557
   5. Crib 2 location lake bottom elevation = 551
   6. Lake low water elevation = 576, normal = 578
   7. On-shore structure to be designed to act as both tunneling pit and wet well for pump station. Structure details to be provided at a later date.

B. Intake Cribs
   1. Design: maximum winter flow dictates port size. Worst case maximum winter flow assumed of ½ of future 85 mgd. Limit winter intake velocity to ≤ 0.25 fps and maximum intake velocity (other than winter) to 0.5 fps.

	mgd	gpm	cfs
Design Flow =	85	59,028	131.5
Winter flow rate factor =	1/2		
Assumed max winter flow =	42.5	29,514	65.8
Max. winter velocity =	0.25	fps	
Max. summer velocity =	0.5	fps	
Req'd waterway area =	263.0	sft	
# of ports =	8		
Req'd port area =	32.9	sft	
Square port dim. =	5.734	ft	
Square port dim. =	68.8	in	

   2. Crib Sizing
      a) Crib shall be sized to accommodate ballasting required to submerge / sink the crib and hold it in place against buoyancy. Crib to remain buoyant when ballast ports are empty and sink with ballast ports are filled.
      b) Sized to resist expected currents and design wave height of 30'.
      c) Crib shall be 48' x 48' with base courses 52' x 52'.
   3. Materials
      a) Timber: #1 Structural Douglas Fir, RC, heavy
      b) Fasteners: drift pins and bolting as per ASTM 36
      c) Stone and rip rap: MDOT 916.01

C. Intake Pipe
   1. Design – Pipe capacity designed for 85 mgd. Velocity in 78" intake pipe is 2.80 fps at 60 mgd and 3.97 fps at 85 mgd.
   2. Access – 42" access manholes located approximately every 1500'
   3. Materials – PCCP, RCP or steel pipe

4. Two stop log chambers shall be constructed, one per branch to each crib, so that each crib can be isolated.
5. After the Y split, the pipe reach from Stop Log Chamber 1 to Crib 1 will be 60" pipe in order to achieve balanced flow with both cribs active. At a Hazen Williams C factor of 135 at initial construction, 49.8% of flow will come from Crib 1 and 50.2% of flow will come from Crib 2. The flow split will be 50/50 when the C factor drops to 132. Detailed calculations are available upon request.
6. If Crib 2 were to be out of service, the flow velocity will be 4.73 fps through the segment of 60" pipe to Crib 1 at 60 mgd.

D. Zebra / Quagga Mussel Control
   1. Chemical - chlorine
   2. Piping – dual wall HDPE or CPVC pipe, separate pipe to each crib for redundancy

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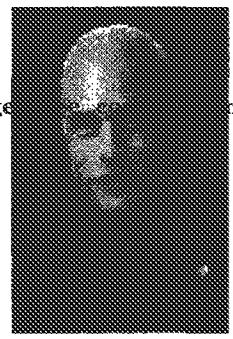
Genesee County approves borrowing $35 million t build Lake Huron water pipeline intake

(http://connect.mlive.com/user/rfonger/index.html)By Ron Fonger | rfonger1@mlive.com
(http://connect.mlive.com/user/rfonger/posts.html)
on October 24, 2012 at 1:00 PM

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GENESEE COUNTY, MI -- Decades after talks about **building a water pipeline to Lake Huron (http://www.mlive.com/news/flint/index.ssf/2012/10/ge[illegible]nmissioners_t_9.html)** started, the county is putting its money where its mouth is.


Jeff Wright

The Board of Commissioners unanimously agreed today, Oct. 24, to back up to $35 million in borrowing on first-phase construction of the pipeline -- a massive intake that will stretch 1.5 miles under the floor of the lake.

"It sounds like a lot of money and it is," said county Drain Commissioner Jeff Wright. But "that's how much we spend every 16 months to buy water from our current supplier."

Building the intake is the first visible step in breaking up with that current supplier, the city of Detroit, which has sold treated lake water to the county and city of Flint since the 1960s.

County board Chairman Jamie Curtis said the decision on the initial borrowing "means the pipeline is on its way."

"That opens this whole region up to the blue economy," Curtis said, referring to the potential for job creation by companies that require large volumes of clean, untreated fresh water.

It remains to be seen whether the pipeline will be built in partnership with the city of Flint -- through the Karegnondi Water Authority, through a separate partnership with smaller potential partners including the city of Lapeer and Lapeer and Sanilac counties, or by Genesee County alone.

Wright said he has set a January goal to begin final engineering on the pipeline -- something that can't be done without knowing whether Flint will be a partner in the project.

Flint's decision that will affect every aspect of the preparation, including the size of transmission pipes and pumping stations that will be needed.

The city's participation in the pipeline has been a question mark, partly because a state-appointed emergency manager rather than the mayor or City Council is making financial decision.

Flint emergency financial manager Ed Kurtz has said that he hopes to reach a decision on the future of Flint's drinking water supply within the next several weeks, something that will also require the approval of state Treasurer Andy Dillon.

Flint resident Chris Del Morone said all the communities that stand to benefit from the pipeline should share in the risk of backing the borrowing if revenue from water sales isn't enough to make future debt payments.

"It's not a question of whether somebody is for the pipeline or not," Del Morone said. "Why is it that only Genesee County is ... on the hook for this?"

Several commissioners have said they are weary of waiting for a regional authority to solidify and prepared to build the pipeline alone if necessary.

"We have waited and waited and waited," said board Chairman Jamie Curtis. "We must go forward.

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"We've crunched the numbers, and we can do it."

The total estimated cost of borrowing for the pipeline is $300 million.

Today's borrowing resolution authorizes Wright to search out the lender that will provide the county with the lowest possible interest rate on its initial borrowing.

The contractor for building the intake portion of the pipeline could be chosen by the close of this year, Wright said, depending on how quickly a U.S. Army Corps of Engineers permit is issued.

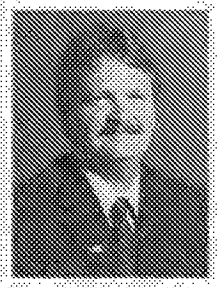
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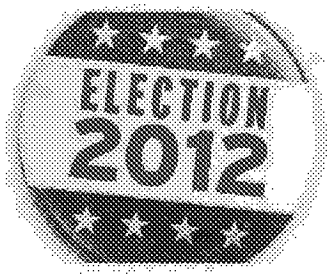


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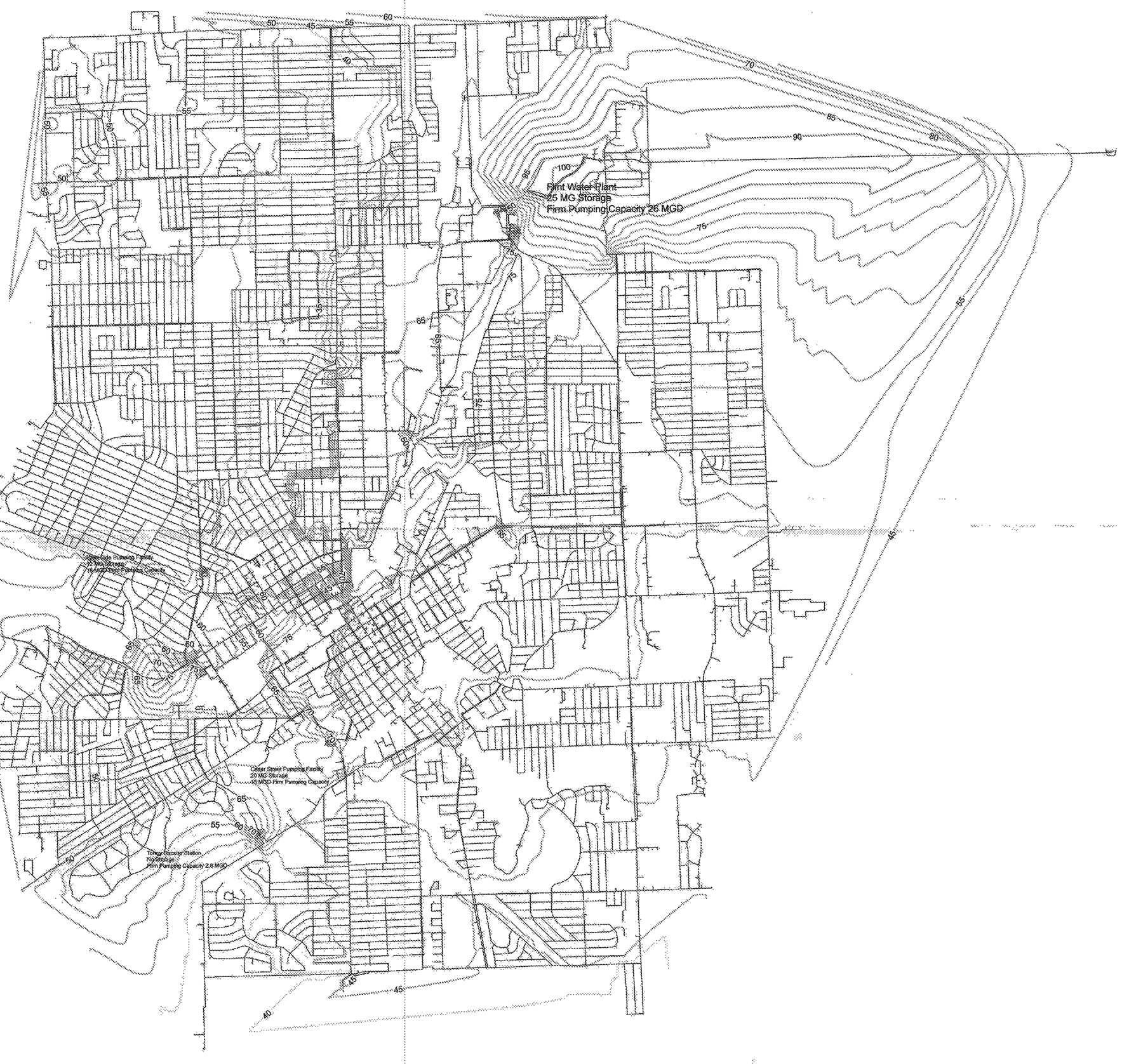
CITY OF FLINT

WATER SYSTEM GENERAL PLAN

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WATER MANAGEMENT DIVISION
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City of Flint Water System
Max Day Pressure Contours
August 2011



City of Flint
Water Reliability Study
Distribution System

December 2013

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LANSING DISTRICT

Prepared by:
ROWE PROFESSIONAL SERVICES COMPANY
and Potter Consulting

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Executive Summary

Reliability Plan Purpose & Scope

The purpose of this Reliability Plan is to conduct an evaluation of the City of Flint water distribution system. This study includes analyzing the water distribution system's ability to address the existing and projected future water demands. The *City of Flint Water System Review* performed by the Michigan Department of Environmental Quality (MDEQ) Drinking Water & Radiological Protection Division in 2008, rated the water distribution system as "deficient", citing key improvements being necessary to the water supply including:

- Distribution system improvements
- Transmission system improvements
- Improvements to pumping stations
- Develop the necessary rate structures to operate and maintain the water system and construct the necessary infrastructure to meet the 20-Year Capital Improvement Program.

With this information, the city will be able to identify necessary improvements to the existing water distribution system and plan for additional capacity at water storage facilities and booster pump stations. Furthermore, they will be able to implement and financially plan for the proposed water infrastructure improvements in the future.

Reliability Study Major Tasks Completed

- City of Flint water system model ported to GIS-based modeling software and model updated to reflect current demands and conditions.
- City of Flint General Plan updated to reflect existing conditions and show all valves and hydrants.
- Genesee County demands added to model.
- Annual Average Day (AAD), Maximum Day (MD), and Peak Hour (PH) scenarios developed.
- Six-Year Capital Improvement Program
- Valve and hydrant assessment
- Calibration of Model
- Calculation of unaccounted for water
- 20-year operational alternatives evaluated
- 20-year demands evaluated and modeled for AAD, MD, PH
- 20-Year Capital Improvement Program
- Water System Asset Evaluation
- Water System Recommendations
- Preliminary Asset Management Plan

Recommendations

The following lists the recommendations of this study (in order of priority):

A. Water System Efficiency

The city's average water system efficiency for the last five years is 63% and this equates to lost revenue in the range of $1.5 million to $2.0 million dollars per year. A program to improve the water system efficiency should be put in place. The key tasks for this program are outlined in Section 4.

B. Water System Storage and Pumping Capacity

The water system has sufficient storage and pumping capacity, however some of the pumping facilities are in need of rehabilitation. The city has submitted a DWRF Project Plan to the Michigan Department of Natural Resources and Environment (DNRE) which includes upgrades to Torrey Road and Cedar Street. These improvements should be completed as funds are available. The pumping and storage capacity of the system exceeds the design requirements for the system, and should be evaluated going forward as the city shifts its long term operating strategy from the Detroit Water & Sewerage Department (DWSD) System to either the Flint River or Karegnondi.

C. Capital Improvement Program

The Water Reliability Study outlines a number of improvements in the short term and over the 20-year study period. The 24" transmission main is the first priority and is eligible for DWRF funding and should be constructed as funds become available. The second priority should be the upgrade and rehabilitation of P.S. 4 on the plant grounds. This station will be key in the future operating scheme of the city system. The Capital Improvements outlined in the report should be evaluated and prioritized on a regular basis as the city moves forward with decisions regarding the long range operation of the system. Table 1 on Page 4 shows the Six-Year CIP projects and the related costs and the map in Appendix 1 shows the locations of the Six-Year CIP Improvements.

D. Valve Replacement Program

The city system includes a variety of valves, and many of these valves are in excess of 50 years old and are in need of replacement. The Water Reliability Study outlines a valve replacement program that would replace these valves over time and at reasonable cost to the system.

E. Hydrant Replacement Program

Similar to the valves, many of the hydrants in the system are in excess of fifty years old and are in need of replacement. The Reliability Study outlines a program to replace the hydrants over time and at a reasonable cost to the system.

F. Water System Automation

Supervisory Control and Data Acquisition (SCADA) systems allow water utilities to more efficiently operate and maintain their system. The city has a moderate SCADA system that is in need of

upgrading and expanding. The review of the SCADA system was not in the scope of this study, but it should be evaluated and upgraded.

G. GIS Based Asset Management

The city has established a GIS Department that is working on inventorying the water and sewer assets of the city. Some of this information was used in the preparation of this report. Given the size and age of the city's water and sewer assets, it would be prudent to incorporate a GIS-based asset management program. There are several packages on the market that can be customized to fit the city's needs.

Table 1: 6-Year Capital Improvement Table

Project Number	Capital Improvement Program	Design Status	Construction Status	2010 Construction Costs	Contingencies, Engineering, Management and Legal (CEM&L @ 47%)	Total CIP Project Cost
	Major Booster Station Improvement Projects					
Project 1	Torrey Road Booster Upgrades (In-house)	Design Complete	Construct 2010	$300,000	$141,000	$441,000
Project 2	Water Pumping Station 3 Electrical and Controls Upgrade	Design in Progress	Construct 2010	$900,000	$423,000	$1,323,000
	Sub Total			**$1,200,000**	**$564,000**	**$1,764,000**
Project 3	**Major Transmission System Improvement Projects**					
Project 4	28,000 LFT of 24" & 30" watermain; WTP to Dupont; South to University	Design Complete	Construct 2011	$10,000,000	$4,700,000	$14,700,000
Project 5	Water Meter Replacement Program 3,000 meters/year		2010-2015	$1,000,000		$5,000,000
Project 6	15,500 LFT of 12" & 24" watermain; Saginaw Street, Flint River to Pierson Road	2010	2012	$3,800,000	$1,786,000	$5,586,000
Project 7	16,100 LFT of 16" watermain; Atherton Road, Van Slyke to Dort	2010	2013	$4,000,000	$1,880,000	$5,880,000
	Sub Total			**$18,800,000**	**$8,366,000**	**$31,166,000**
	Minor Transmission System Improvement Projects					
Project 8	500 LFT of 6" watermain; Hamilton Avenue, Mason Street to MLK Boulevard.	2010	2011	$50,000	$23,500	$73,500
Project 9	1,650, LFT of 6" watermain; Sonny Avenue, Dupont to Lawndale	2010	2011	$165,000	$77,550	$242,550
Project 10	1500 LFT of 6" watermain; Walton Street, Clairmont to Augusta	2010	2012	$150,000	$70,500	$220,500
Project 11	1500 LFT of 6" watermain; East Boulevard, Farmers Market to Park	2011	2013	$150,000	$70,500	$220,500
Project 12	325 LFT of 6" watermain; Alexander Street, Taylor to Rankin	2011	2014	$32,500	$15,275	$47,775
Project 13	1075 LFT of 6" watermain; Mack Street, Clio Road to Winona	2011	2015	$122,500	$57,575	$180,075
	Sub Total			**$670,000**	**$314,900**	**$984,900**
	Total CIP Costs			**$20,670,000**	**$9,244,900**	**$33,914,900**

Section 2 - Introduction

2.0 Background

The City of Flint currently provides water service to a population of approximately 118,000 through an extensive network of transmission and distribution mains. Many of these mains are aging and are in need of replacement. The city also operates several booster pumping stations and storage facilities to boost pressures and enhance service. The *City of Flint Water System Review* performed by the Michigan Department of Environmental Quality, Drinking Water & Radiological Protection Division in 2008, rated the water distribution system as "deficient", citing key improvements being necessary to the water supply including:

- Distribution system improvements
- Transmission system improvements
- Improvements to pumping stations
- Development of an Asset Management System

The review also states that much of the piping within the City of Flint is more than 70 years old and is in serious need of replacement. The City of Flint Water Service Center, which operates and maintains the water system, spends a significant amount of time repairing mains that are in poor condition. Each winter, a large number of watermain breaks occur due to the aging condition of the watermains. These breaks result in interruptions in water service and potential public health risks to city customers.

In response to this deficiency rating, the city retained ROWE Professional Services Company to develop a Water System Reliability Study to correct these deficiencies.

Before beginning the Water Reliability Study process, ROWE Professional Services Company met with City of Flint officials and Michigan DNRE staff to determine the goals of the study. These discussions produced a three-phase approach to addressing the issues raised by the DNRE. This study completes the first two phases; Phase 3 includes the treatment plant and will be analyzed in a future study.

A. Phase 1 – Model Update and Short Term CIP

Key tasks include:

- Update the city's water model including demand allocations, pumping and storage facilities, piping changes, and other associated infrastructure
- Update the city's General Water Plan
- Evaluate existing conditions and develop a short-term (6-year) Capital Improvement Plan
- Update the Contingency Plan
- Calibrate the city water model
- Analyze valve and hydrant deficiencies

B. Phase 2 – Distribution System Asset Management and 20-Year Capital Improvement Plan

Key tasks include:

- Develop modeling scenarios for 20-year water system plan
- Develop 20-year plan for the water system
- Prepare cost opinions for 20-year plan
- Analyze rate structure to support 20-year plan
- Develop an asset management plan
- Inventory water distribution system assets

2.1 Existing Conditions

A. Source Facilities

The City of Flint purchases treated water from the City of Detroit through the DWSD. The treated water is supplied to Flint via a 72-inch transmission main. This transmission main also provides water service to Genesee County and several other communities between Flint and Detroit. The flow to the City of Flint is metered to provide accurate water use records.

The city also maintains a water treatment plant as a backup supply in the event that the City of Detroit water supply is interrupted. Work to upgrade the City of Flint Water Treatment Plant (WTP) began several years ago and is progressing to completion. A number of test runs were initiated in 2006, 2007, and 2008. Additional test runs are planned for the future. The majority of the improvements at the plant have been implemented as a result. The plant is generally ready for use in a standby capacity, in the event that service from the City of Detroit water supply is interrupted. Long-term plans include provisions for expanding the capacity of the plant and implementing a softening system.

B. Water Treatment

The water purchased from the DWSD is already treated prior to reaching the City of Flint system; typically, no further treatment is required. The City of Flint also owns and operates a water treatment plant located at 4500 North Dort Highway, which serves as a backup supply in the event of a major service disruption from the DWSD water supply. The source for the City of Flint water treatment plant is the Flint River. The city has made significant improvements to the plant over the past five years and operates the water treatment plant on a quarterly basis to ensure proper operation of the plant. According to the contract with the DWSD, this water is isolated from the DWSD supply to prevent water from the two different supplies from mixing.

While the treatment plant is considered a viable backup water supply for the system, the plant is not currently operating. There are additional issues that will require a significant amount of capital investment in the future. The City of Flint estimates that the upgrades to the water treatment plant will cost approximately $25,000,000.

C. Evaluation of Storage and Pumping Facilities

The City of Flint owns and operates several water storage facilities and pumping stations. The *City of Flint Water System Review*, prepared by the MDEQ, includes a detailed review of these facilities. This review states that adequate storage and pumping facilities are currently in place; however, most of the systems are nearing their useful life and are in need of repair or replacement. A brief overview of each facility follows.

1. Dort Reservoir and Pumping Station No. 4 (P.S. No. 4)

   The Dort Reservoir is located at the City of Flint WTP and is a 20-million gallon (MG) ground storage facility. This facility was constructed in 1966 and is used primarily for emergency water storage and for use during peak water demand periods.

   Pumping Station No. 4 is equipped with three 20 mgd turbine pumps, one 25 mgd turbine pump, and one 6 mgd turbine pump. Pumps 7, 8 and 9 were installed in 1994 and Pumps 1 and 2 were installed in 1949. Pumps 1 and 2 are both considered inoperable and there are no plans to replace or repair the inoperable pumps at this time. The total pumping capacity of this station is 46 mgd, with a firm pumping capacity of 26 mgd. In 1994, the pumping station was rehabilitated with two new 20 mgd pumps and one 6 mgd pump to induce turn-over of the Dort Reservoir. This pumping station is primarily used to provide a supply from the 20 MG Dort Reservoir during emergency situations and peak demand events.

2. WTP Elevated Tank

   A 2.0 MG elevated water storage tank is located at the WTP. This tank was constructed in 1952 and is used primarily for emergency water storage and as a pressure buffer. The elevated tank fills and drains as system demands and pressures dictate. The tank was inspected and repainted in 2009.

3. WTP Ground Storage Facility

   A 3.0 MG ground storage tank is also located at the WTP complex. This storage tank was constructed in 1954 and is used primarily as an emergency water supply and pumping source during peak demand events.

4. Cedar Street Reservoir and Pumping Station (P.S. No. 3)

   The Cedar Street Reservoir is a 20 MG ground storage facility located between I-69 and Swartz Creek, off of Cedar Street. This facility was constructed in 1948 and is primarily used as an emergency water supply and pumping source during peak demand events. The pumping station electrical controls have not been updated since the original construction. The station requires significant upgrades to bring the station up to current automatic operation standards.

The pumping station located at the Cedar Street facility is equipped with three single-stage horizontal centrifugal pumps rated at 12 mgd, 9 mgd, and 9 mgd, respectively. These pumps were installed in 1948 and are primarily used to supply water from the Cedar Street reservoir during emergency events and peak demand periods. This pumping facility has a total pumping capacity of 30 mgd and a firm pump capacity of 18 mgd.

Pump operation and filling of the reservoir can be controlled from the WTP or manually at the pumping station. Typically, the reservoir is refilled at night during low demand periods. The pumping station is equipped with chlorination facilities to provide additional chlorine residual as needed.

5. West Side Reservoir and Pumping Station (P.S. No. 5)

The West Side Reservoir is a 12 MG ground storage facility located near Mackin Road and Jean Avenue. This facility was constructed in 1970 and is primarily used as an emergency water supply and a pumping source during peak demand events.

The West Side Pumping Station is equipped with 2 three-stage turbine pumps and 2 two-stage turbine pumps, all installed in 1970. Pumps 1 and 2 have a capacity of 8 mgd each, and Pumps 3 and 4 have a capacity of 4 mgd each. The total pumping capacity of P.S. No. 5 is 24 mgd with a firm pump capacity of 16 mgd.

Pump operation and filling of the reservoir can be controlled from the WTP or manually at the pumping station. Typically, the reservoir is refilled at night during low demand periods. The pumping station is equipped with chlorination facilities to provide additional chlorine residual as needed.

It is recommended that the existing swing check valves on two of the pumps at this station be replaced to allow for proper operations of the station, and to eliminate water hammer caused by the spring check valves upon start up and shut down of the pumps. This work was budgeted for 2006 and 2007, but never implemented. The city is currently working to implement these upgrades in 2012.

6. Torrey Road Pumping Station

The Torrey Road Pumping Station is equipped with two centrifugal pumps rated at 2.8 mgd and 4 mgd, respectively. Both pumps were installed in 1954. The station has a total pump capacity of 6.8 mgd and a firm pump capacity of 2.8 mgd. The primary function of this station is as an in-line booster pumping station to provide increased pressures to the southwest portion of the city. This pumping station takes suction from the 24" transmission main along Hammerburg Road and discharges to the 18" transmission main supplying the southwest pressure district. There is no standby power provided to this pumping station.

The City of Flint has made plans to replace the existing pumps and piping in the station. The existing pumps have exceeded their useful life and the piping and valves are in poor condition. The station is scheduled for upgraded pumps and interior piping in 2012. Permit applications were submitted to the DNRE in April 2010.

D. Condition of Service Lines

Service lines appear to be in adequate condition, with typical repairs made by city staff, depending on the age of the existing watermain and water services connected to it. The city does experience problems with a number of existing valves. The long-term needs for the system include replacement of the existing valves over the next 20 years. The total estimated cost to replace the valves is approximately $2,000,000.

E. Type of Conveyance System

The conveyance system of the City of Flint consists of water distribution and transmission main ranging in size from 4" to 72" in diameter. Many of these mains exceed 70 years old, and the majority are constructed of cast iron or ductile iron pipe up to 24" in diameter. Transmission mains larger than 24" are primarily constructed of steel piping.

The majority of the city's system has adequate transmission piping to convey sufficient flows and pressure for fire protection. However, the distribution and transmission systems are old and in serious need of replacement. Every year, a large number of watermain breaks occur within the city. These breaks, which are repaired by city staff, result in serious water service disruptions and potential water quality problems to customers of the City of Flint. The Six-Year Capital Improvement Program (CIP) in Table 1 is intended to remedy the most pressing of these infrastructure problems and the 20-Year CIP in this study will take a long term look at system-wide problems and solutions. Recent improvements to the distribution system are shown in Appendix 2.

F. Appurtenances

The City of Flint system appurtenances, similar to the conveyance system, are in general over 50 years old and in constant need of repair or replacement.

1. Valves

   The City of Flint distribution system currently has 3,931 gate valves and 3,327 gate well valves for total valve count of 7,258 valves to be operated and maintained. A breakdown of the valves by size is shown in Table 2 below.

Table 2: Valves by Size

Valve Size	Valve Count
72"	20
24" and >	661
16 - 20	737
12	1398
<12	4462

The development of an asset management plan for the valve system would include a process to move from reactionary valve maintenance to planned preventative maintenance and replacement. Given the size and age of the city system, this will take some time to transition and the following is a general outline of a plan to accomplish this over a 20-year period while addressing the critical valves within two years. In general, the asset management plan for the operation and maintenance of the valve system has been divided into three categories: critical; subcritical; and normal.

Critical valves are 16" and larger that are on the primary transmission mains around the city, and in the event of a break in a major transmission main, valve failure, or multiple valve failures, could result in shutting down a significant portion of the city. A preliminary evaluation indicates that there are 1,398 critical valves in the system and these valves should receive primary attention. Primary attention would consist of operating the valves on a rotating two-year basis and making all repairs and replacements that are necessary. Approximately 700 critical valves would be operated and maintained each year.

Subcritical valves are the 12" valves on minor transmission mains and the failure of one or more of these valves could result in shutting down a residential area. There are 1,398 subcritical valves in the system. These valves should receive secondary attention which would consist of a 5-year plan for operation and maintenance. This would require that approximately 280 valves be operated and maintained each year.

Normal valves are any valve smaller than 12" and the failure of one or more of these valves would shut down a small residential area. There are 4,462 of these valves in the system and these valves should receive operation and maintenance attention on a 10-year rotating basis. Approximately 450 valves would require attention each year.

The total valve operation and maintenance program would require that approximately 1,430 valves receive routine maintenance each year, in addition to any emergency repair and replacement that is required during the course of a year. Appendix 3 includes a map of the water system valves.

2. Hydrants

The City of Flint has 3,605 hydrants in the water system and as with the watermains and valves; many of these hydrants are in excess of 50 years old. In the spring of 2010, the city purchased 80 hydrants to begin replacing old hydrants while the Reliability Study was completed.

Similar to the asset management approach to the valve maintenance, the plan for hydrants would include a transition from reactive maintenance to planned maintenance and replacement. Here the goal would be to analyze the hydrant age in the system and begin to change out hydrants in excess of 50 years old, and then over a period of twenty years create a system where hydrant age did not exceed 25 years. Appendix 4 includes a map of the water system hydrants

G. Method of Residuals Handling

The WTP is a back-up facility and does not currently generate significant residuals. If the WTP becomes the primary water source for the city, a residuals management plan will need to be submitted to the MDEQ.

H. Design Capacity of the System

The design capacity of the waterworks system, in the form of the maximum day demand, is 36.0 mgd. The total source capacity from the DWSD exceeds 70 mgd, with a firm source capacity of 36 mgd.

The City of Flint has completed the WTP rehabilitation project, which was partially funded through the DWRF program. The city has already conducted several trial runs and is expected to complete the project in the near future. The improvements result in a firm capacity of 36 mgd.

I. Operation and Maintenance of the System

The City of Flint operates the system manually, using trained personnel with the experience and knowledge to assure proper and adequate control of the system. City personnel estimate the daily water demand anticipated to service the City of Flint and surrounding Genesee County communities and communicate such needs to personnel at the DWSD, who ensure delivery. City staff usually communicates with DWSD staff twice daily.

Water is supplied from the DWSD at an approximate pressure of 103 psi. Water demands of Genesee County communities are taken off the distribution system between the location of the DWSD water supply meter and Control Station 2 (CS 2) at the City of Flint WTP. CS 2 has a pressure reducing valve which regulates and lowers the supply pressure from 103 psi to approximately 75 psi.

If the supply pressure from the DWSD is greater than 105 psi, the valve to the Dort Reservoir at Control Station 3 (CS 3) is opened. The valve at CS 3 is also operated when the water level in the elevated tank is more than 33 feet. The Dort Reservoir is kept at a 16 foot level to have available volume for water demand fluctuations.

The Dort Reservoir is connected to Clear Well No. 3 through a valve at Control Station 5 (CS 5). The 6 MG pump located in P.S. No. 4 is used to turn over the water stored at the Dort Reservoir. The other pumps are used, as necessary, to increase distribution system low pressures due to fire flow, main breaks, and high demands.

The elevated tank fills and empties based on system pressure. If the elevated tank level drops below 20 feet during the hours of 7:00 a.m. and 3:00 p.m., P.S. No. 3 at the Cedar Street Reservoir or P.S. No. 5 at West Side are placed on-line to supply additional water to the system. Typically only one of the two stations is used at a time, and station use is alternated in order to ensure proper operation of the system.

The Cedar Street and West Side Reservoirs are filled during the night between the hours of 11:00 p.m. and 7:00 a.m., after the elevated tank is full. The West Side Reservoir is filled first; when its level is 16 feet, the filling of Cedar Street Reservoir begins.

Pump Stations 3, 4, and 5 are controlled remotely from the Water Plant Facility. The filling operation of the reservoirs is based on opening the fill valves remotely. The fill rates are controlled by opening the valve a certain percentage.

The Torrey Road Booster Pumping Station is controlled utilizing a pressure sensing station at Brown Street and Bradley Avenue (B&B). The booster pumping station has two pumps. Pumps 1 and 2 are normally operated to maintain pressure at B&B between 40 & 50 psi. This pump station does not have a secondary power source (auxiliary power) in case of power interruption.

2.2 Water Master Plan References

Several studies, reports, maps and publications were used as reference material in completing the City of Flint Water Reliability Study, including the following:

1. 2009 City of Flint DWRF Plan
2. *Modeling, Analysis, and Design of Water Distribution System*, Lee Cesario, American Water Works Association, 1995
3. *Recommended Standards for Water, Great Lakes Upper Mississippi River, Board of State Public Health and Environmental Managers (Ten State Standards)*, 2003
4. City of Flint website
5. U.S. Census Bureau surveys

2.3 Abbreviations

AADD – Annual Average Day Demand
AWWA - American Water Works Association
DIP - Ductile Iron Pipe
DPW - Department of Public Works
DWSD - Detroit Water & Sewerage Department
FWS – Flint Water System
GCDC - Genesee County Drain Commissioner
GCDC-WWS - Genesee County Drain Commissioner, Division of Water & Waste Services
gpd - gallons per day
gpcd - gallons per capita per day
MGD - Million Gallons per Day
gpm - gallons per minute
HGL - Hydraulic Grade Line
Hp - Horsepower
ISO - Insurance Services Office
MG - Million Gallons
MDD - Maximum Day Demand
MDEQ - Michigan Department of Environmental Quality
DNRE – Department of Natural Resources and Environment
MDOT - Michigan Department of Transportation
O&M - Operation and Maintenance
ROW - Right-of-Way
ROWE – ROWE Professional Services Company
PHD - Peak Hour Demand
psi - pounds per square inch
REU - Residential Equivalent Unit
TDH - Total Dynamic Head
USEPA - United Stated Environmental Protection Agency
USGS - United States Geological Survey
VFD - Variable Frequency Drive
WTP - Water Treatment Plant

2.4 Staffing

Operation of the City of Flint water system is provided by the WTP staff and maintenance of the distribution system is provided by the Water Service Center. The organizational charts for the two entities are included in Appendix 5.

The Water Treatment Center currently has 28 budgeted positions with five vacancies. The city is currently interviewing for three of the vacant positions and will evaluate staffing needs after these three positions are filled. Due to economic conditions in the city, it is unknown whether the remaining vacancies will be filled.

The Water Service Center has 48 full-time equivalent positions with 5 vacancies. Due to economic conditions, there are no current plans to fill the vacancies. In early 2010, crew levels were reduced and overtime was eliminated curtailing the Water Service Center's ability to maintain the system.

2.5 Existing Capital Improvement Plan

In 2009, ROWE prepared a DWRF Project Plan for the city outlining a number of projects, including replacement of the Torrey Road Booster Station and the construction of 28,000 feet of 24" watermain. Due to economic conditions these projects have not been constructed. A revised 6-Year City of Flint CIP is shown in Table 1 in the Executive Summary. The city is currently moving forward with the replacement of key equipment at the Torrey Road Station and electrical and control improvements at the Cedar Street Station. The city is currently seeking funding for the 24" watermain and hopes to begin construction in 2012.

2.6 Existing and Proposed Water Service Area

The City of Flint is the service area for the purpose of the Reliability Study. However, the city provides water to Genesee County from several metered connection points along the city's 72" feed from the DWSD (see general plan). The city does not operate or maintain the county system.

The City of Flint, along with Genesee County, Lapeer County, and the City of Lapeer, formed the Karegnondi Water Authority for the purpose of exploring the possibility of developing a Lake Huron water intake and providing raw water to the member communities. The member communities would then treat the raw water at plants located within their jurisdiction.

The City of Flint has also entered into discussions with Genesee County to provide emergency backup water supply to a portion of the county system. At this writing, the volume under discussion was 8 MGD to be delivered at a connection point to be determined, on the north side of the City of Flint water system. This is discussed further in Section 3.6.

2.7 General Plan

The general plan of a water system is essentially a map of the system showing watermains, valves, hydrants, and major pumping and storage facilities of the system. The general plan can also include such items as pressure districts; however, the Flint Water System (FWS) operates as one pressure district. The general plan has been updated as part of this report and is included in Appendix 6. Areas that were updated are highlighted and labeled.

2.8 Cross-Connection Program

The city operates a cross-connection plan through the wastewater plant. The cross connection program is in compliance and a copy of the program is on file at the city.

2.9 Water Shortage Response Plan

There are several potential situations that could result in a water shortage in the City of Flint. In each case, the city has sufficient infrastructure, equipment, and redundancy to resolve any water shortage situation that may arise. In each case, a press release outlining the nature of the water shortage and a request to limit water usage would be issued by the city. The following are representative of these potential situations:

A. Loss of Service from the DWSD

In the event that the city loses water service from the DWSD, the city would run off the 57 MG of existing storage, while implementing its EOS by putting the back-up water plant in service to feed the system, until such time as water service from the DWSD is restored.

B. Loss of Elevated Tower

The city currently has one elevated tower located on the treatment plant grounds. In a case where the elevated tower was out of service for repairs or painting, the system would run off the DWSD pressure with peak flows supplied by the West Side Station, Cedar Street Station or Torrey Road Booster Station. DWSD pressure would refill the storage at Cedar and West Side each night.

C. Loss of Pumping Facility

The City of Flint water system is supplied by DWSD water pressure. The city has three pumping facilities in addition to P.S. No. 4 at the plant. West Side Pumping and Storage Facility, and Cedar Street Pumping and Storage Facility, are alternated each day to supply peak flows to the system. In the event that either of the stations were out of service, the other could supply all the needs of the city. In the event that both stations were out of service, the system could run off the DWSD pressures. The Torrey Road Booster Station supplies peak flows to the Hospital Hill area. In the event that Torrey Road Booster Station was out of service, the Cedar Street Station could be used to supply peak flows to the hospital area.

D. Watermain Break on Major Transmission Main

The city has a well-designed system with significant looping of major supply lines. Extensive modeling was done with various sections of the key transmission mains out of service and in all cases the impacts were minimal. This analysis assumes that system valves will operate as intended.

2.10 Contingency Plan

The contingency plan outlines the emergency measures that can be taken in the event of a major infrastructure failure or local disaster. The plan includes emergency notification procedures, emergency contact numbers for city employees, contractors, neighboring municipalities, and other information related to managing water system emergencies. The contingency plan was updated in 2010 and a copy is on file at the city.

2.11 Historical Water Use

Water use is determined primarily by the total of residential, commercial and industrial use. Historical purchases and sales records can be very useful in determining future system improvements. Meter records indicate the amount of water supplied to the City of Flint. City records show the metered sales for residential, commercial and industrial customers. Table 3 below summarizes the city's historical water use, including Genesee County, for the past eight years. Table 4 shows the city's usage during the same period.

Table 3: City of Flint Flows from the DWSD (MG)

Year	Flows
2004	30.76
2005	31.80
2006	29.05
2007	31.35
2008	28.56
2009	24.5
2010	26.9
2011	24.4

Source: City of Flint

Table 4: City of Flint Usage (MG)

Year	Usage
2004	17.8
2005	18.2
2006	17.0
2008	15.23
2009	14.04
2010	6.9
2011	8.2

Source: City of Flint

2.12 Water Distribution System Master Metering – Genesee County

Genesee County is the city's largest customer and takes water off the 72" pipeline at a number of locations, and has the ability to take water from the Flint distribution system. The following Table shows the Genesee County meter locations and AADD for each meter location.

Table 5: Water Distribution System Master Metering – Genesee County

Meter Location	Meter Size	2011 AADD (MGD)
West Carpenter	6"	Inactive
G3000 Flushing Road	6"	Inactive
G3348 Flushing Road	6"	0.1
G3167 West Pierson	6"	Inactive
G3376 North Genesee	10"	Inactive
Kearsley Circle	24"	4.4
Potter and Belsay	10"	1.7
Potter and Irish	10"	2.1
Oak and Potter	10"	0.6
Henderson and Potter	36"	3.4
M-15 and Potter	10"	0.3
Total		12.6

Source: City of Flint

2.13 Unaccounted for Water Use

The difference between the quantity of water supplied to the City of Flint and the quantity sold to customers is referred to as "unaccounted for" water. Water in a public system can be unaccounted for due to a number of reasons. Water withdrawn from a fire hydrant, whether it is to fight a fire or flush a water main, is un-metered and therefore "unaccounted for". Leaks and watermain breaks, faulty or inaccurate meters, unauthorized connections and un-metered municipal water use also contribute to "unaccounted for" water.

Water system efficiency analysis indicates that the City of Flint system averages 63 percent over the last five years. This indicates that the city has significant leaks, inaccurate meters and/or illegal connections to the system. A high priority should be placed on implementing a program to reduce the "unaccounted for" water. The program should include: testing high volume meters, leak detection analysis, residential meter replacement, billing system review, and fire flow estimates.

Table 6 and 7 below show the historical "unaccounted for" water.

Table 6: FWS and GCDC-WWS Combined "Unaccounted for" Water

Year	[illegible]	[illegible]	[illegible]
2004	15,008,384	12,599,895	83.95%
2005	15,514,886	12,959,400	83.53%
2006	14,174,832	11,208,001	79.07%
2007	15,295,449	12,575,645	82.22%
2008	13,934,327	11,204,322	80.41%
2009	11,943,960	10,027,390	83.95%
2010	13,108,730	10,140,121	77.35
2011	11,926,870	9,650,632	80.92

Table 7: City of Flint Efficiency 2007 - 2011

Year	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2007	15,295,449	6,907,946	8,387,503	12,575,645	5,667,699	0.68
2008	13,934,327	6,418,120	7,516,207	11,204,322	4,786,202	0.64
2009	11,943,960	6,069,843	5,874,117	10,027,390	3,957,547	0.67
2010	13,108,730	6,263,618	6,845,112	10,140,121	3,876,503	0.57
2011	11,926,870	6,121,590	5,805,280	9,650,632	3,529,042	0.61
Totals	**66,209,336**	**31,781,117**	**34,428,219**	**53,598,110**	**21,816,993**	**0.63**

2.14 Demographics

A. Population

Flint lost almost 18,000 people between the 2005 mid-decade census and the 2010 census. Given the current economic situation, this trend is anticipated to continue over the next twenty years. See Appendix 7 for full Genesee County population data.

Table 8: Population Figures

Year	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2005	120,283	41,026	1,500	42,526			
2010	102,400	35,052	1,686	36,738	7,851	18,319	23,552
2015	100,000	34,230	1,647	35,877	7,667	17,890	23,000
2020	98,000	33,546	1,614	35,159	7,513	17,532	22,540
2025	96,000	32,861	1,581	34,442	7,360	17,174	22,080
2030	94,000	32,176	1,548	33,724	7,207	16,817	21,620

Population projections from Regional Planning Agencies for the 2010 Census are not available as of this writing.

Genesee County, which accounts for approximately 57% of the water usage, is the largest purchaser of water from the City of Flint. For the purpose of the table below, the water usage by Genesee County has been removed from the calculations. The following table lists the major water users among the commercial and industrial operations in the City of Flint.

Table 9: Major Water Users

[illegible]	[illegible]	[illegible]
Beecher Metro District	Carpenter Road	907,896
General Motors (South Complex)	3100 Van Slyke	696,132
Beecher Metro District	Premier Street	200,016
Thomas Raymond	1402 Davison Road	119,928
McLaren Regional Medical Facility	401 Ballenger	113,772
Country Fresh Dairy	158 Genesee	75,276
Genesee County Jail	1100 Saginaw Street	60,432
Buick Motor Division	Stewart Avenue	47,868
Evergreen Regency	2622 Trout Drive	45,300
Delphi	1101 Center Road	42,000
U of M Flint	502 Mill Street	38,616
Country Fresh Dairy	609 Chavez	37,236
Hurley Medical Center	6th & Begole	37,176
Buick Motor – Industrial Waste	St. John Street	33,912
Evergreen Regency	2102 Trout Drive	32,424
Delphi	Robert T Longway	30,096
Hurley Medical Center	1 Hurley Plaza	26,856
Country Club Manor	1901 Woods Leaf	23,616
Flint Odyessy House	529 M L King Avenue	23,436
Hurley Medical Center	1001 Begole Street	23,268
American MHP	2701 Branch Road	22,428
Kettering University	501 Chevrolet Drive	21,216
Lockhart Chemical	4701 Thetford Drive	20,400
Country Fresh Dairy	158 Genesee	19,872
Genesee Forest Estates	1806 Webster Road	19,440

(Source: City of Flint Department of Public Works and Utilities, March 2009)

2.15 Land Use

The zoning map shows the city remaining relatively constant over the next five years, as there is little pressure for growth into vacant, open or wooded areas. It is difficult to predict land use over the next 20 years, except to say that most of the industrial urban cities along the I-75 corridor in Michigan have experienced very little growth pressure over the last 10 years and reported a loss in population with the 2010 census. Both of these are true for the City of Flint, and population loss has increased since the 2010 census. It is likely that this trend will continue in the near future. The map in Appendix 8 shows the general location of existing land uses in the area.

2.16 Modeling Conditions & Scenarios

For purposes of this study, four conditions were analyzed. These conditions include the following:

A. Existing System and Future System

The existing water distribution system was analyzed with the current demands from the existing developments to identify potential capacity problems within the existing water infrastructure. The existing demands were developed from City of Flint billing records, Genesee County meter pit data, and DWSD data.

1. Annual Average Day Demands (ADD)
2. Maximum Day Demand (MDD)
3. Peak Hour Demand (PHD)
4. Fire Flow Demands (FFD)

Section 3 - Water Demands

System demands were developed from City of Flint billing records and water plant records. Demands for Genesee County meter pits were developed from Genesee County data. Residential demands were spread evenly across the system. Commercial demands were evaluated individually and attributed to the nearest node in the model. Genesee County demands were input at master meter pit locations.

3.0 Annual Average Day Demand (AADD)

The AADD is the total annual water use divided by 365 days/year. In the case of the City of Flint, the AADD's were developed using City of Flint billing records, water plant information, master meter readings, commercial meter analysis and the modeling process. A summary of that data is provided in Table 10 below. Annual Average Day Demand contours are shown in Appendix 9.

Table 10: City of Flint Annual Average Day Demands

	Number of Units	Water Usage				
Residential	32,604	162,937	1,955,248	123	4,006,919	2,783
Commercial	1,768	292,701	3,512,417	4,128	7,198,049	4,999
City Totals	38,184	475,788	5,709,456	4,404	11,700,474	7,781
GCDC Meter Pits	10	510,133	6,121,590	1,254,506	12,545,067	8,712
All	72,566	1,441,559	17,298,711	492	35,450,509	24,275
2011 Data						

3.1 Maximum Day Demands (MDD)

Maximum day demand (MDD) is the highest daily usage that occurs during the course of a year. Public water systems typically experience a variety of demands generated by the community. Water usage can vary from season to season, day to day, and even hour to hour. Water usage is usually higher during certain times of the week and certain times of the day. Water usage is also typically higher in summer months and lower during the winter months. A water system must be able to meet the wide range of demands expected to occur.

A public water distribution system should have adequate water supply to meet the MDD. Generally, system storage and system pumping facilities should be sized to buffer the difference between AADD and MDD. The MDD is the greatest amount of water used over a 24-hour period. The observed MDD from the city in the last five years is 26.38 MGD and occurred in 2007. Typically MDD are 2-3 times average day demands. The City of Flint's MDD is approximately 1.5-2.0 times average day and this would be typical of an older system with minimal lawn sprinkling demand.

Maximum day pressure contours are shown in Appendix 10. There is a small area that the model projects Maximum day pressure at 35 psi. It is recommended that the city perform some pressure tests in this area to determine the whether the field conditions mimic the model conditions.

3.2 Peak Hour Demands (PHD)

The PHD is the greatest amount of water used during any 60-minute period of time. Generally, storage should be available to provide the difference between the PHD and MDD. The water distribution system must be able to deliver the PHD. Peak hour demands are not available from the city and are estimated to be three times the average hour.

3.3 Future Demands

Genesee County Metropolitan Alliance and Genesee County Planning Commission Table in Appendix 7 indicates that the population in the City of Flint will continue to shrink through the period of the study 2010 through 2030. Figures 1 and 2 below illustrate the declining population, customers, and declining water use projections for the city.

Figure 1: City of Flint Water Customers - Future Estimates

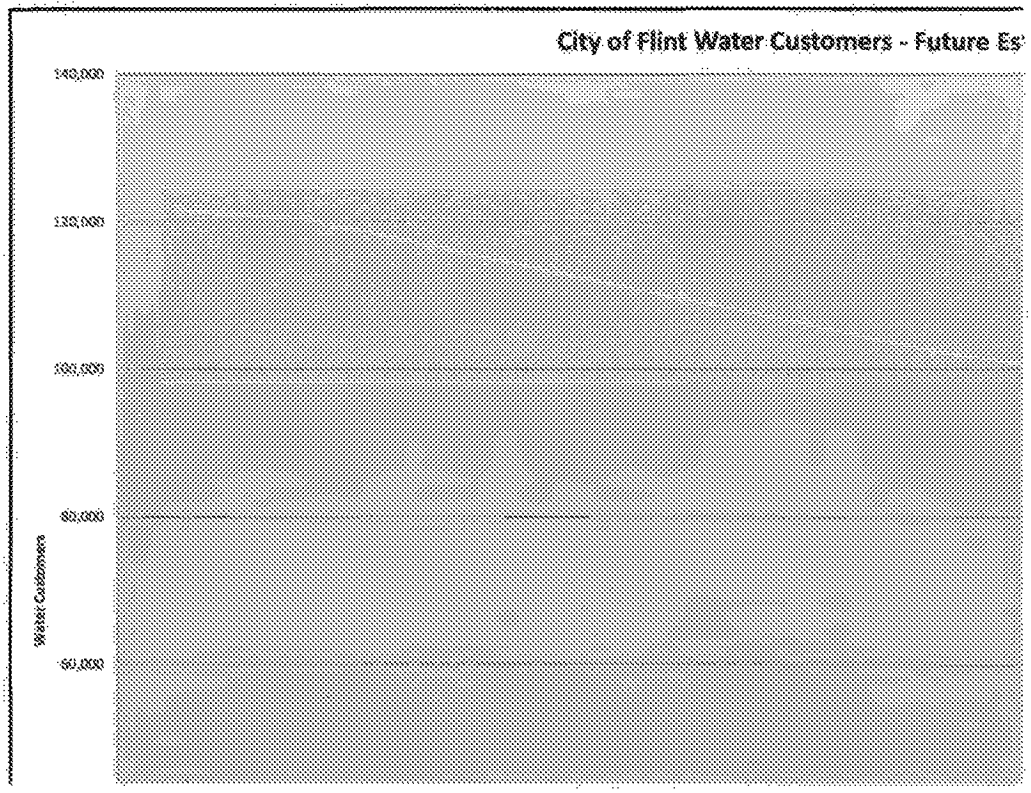
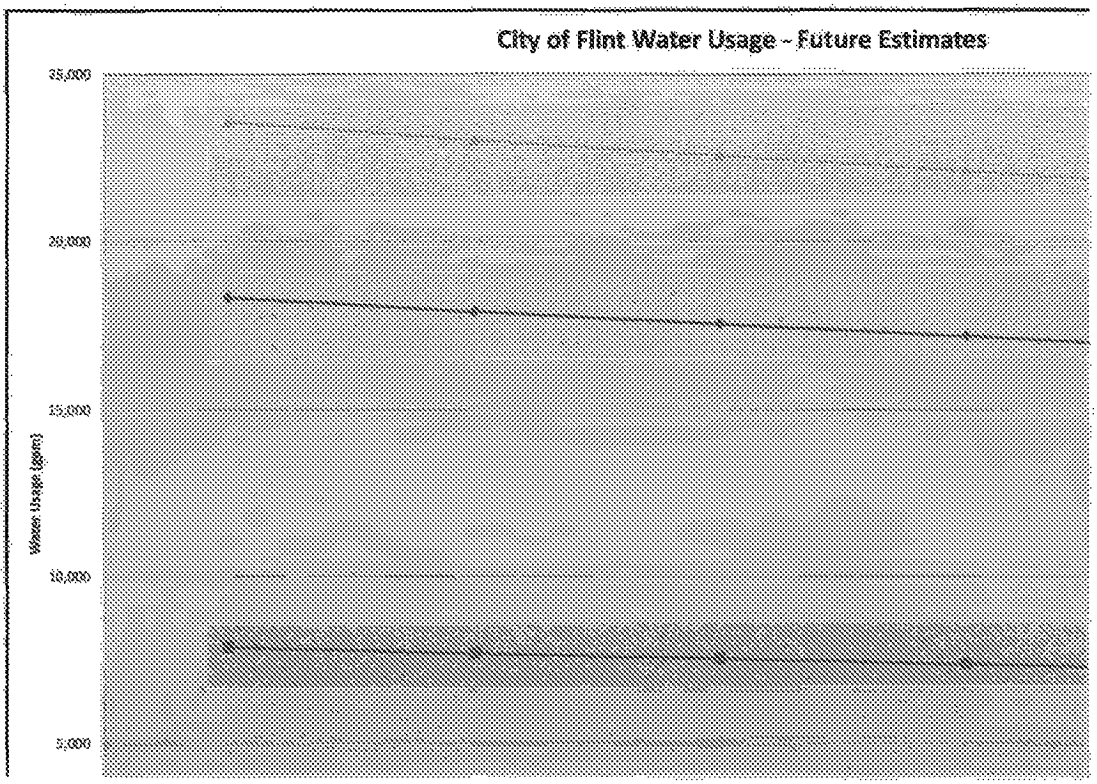


Figure 2: City of Flint Water Usage - Future Estimates



3.4 Fire Flow Demands (FFD)

In the event of a fire, it is desirable that a public water distribution system be capable of meeting certain flow and pressure guidelines established by the AWWA and ISO for public water systems. The actual recommendations for fire protection vary depending on factors such as building use, construction materials, fire suppression regulations, and proximity to hydrants. The following fire flow criteria were developed using ISO and AWWA guidelines. Areas of the city that have 4" pipe will not meet these standards in some cases, and the following are goals to be taken into consideration when planning and designing upgrades for the FWS.

A. Residential Fire

In the event of a residential fire, a water demand of 1,000 gpm should be available for firefighting for a period of four hours. The system should maintain a minimum pressure of 20 psi throughout the remainder of the water distribution system during the time the fire is being fought. The areas of the city that are unable to meet the fire flow goal are located where 4" watermains are present. The 4" watermain replacement plan will remedy the fire flow deficiencies in these areas.

B. Commercial or Industrial Fire

In the event of a school, commercial, or industrial building fire, a water demand of 1,500 gpm should be available for firefighting for a period of four hours. The water distribution system should maintain a minimum pressure of 20 psi throughout the remainder of the water distribution system during the

time the fire is being fought. A representative number of locations were modeled and in cases where the watermain was at least 8", the system met the above criteria. ISO recommendations for commercial and industrial facilities vary significantly and can be as high as 5,000 gpm. Interior sprinkling systems for these types of facilities are highly desirable.

Section 4 - 20-Year Water Supply, Distribution and Storage

4.0 Water Supply Planning Criteria

The following were used as planning standards for this study:

1. System pressures not lower than 20 psi and not higher than 100 psi
2. Normal operating pressures between 40 psi and 75 psi
3. System storage requirements of 2 times Average Day Demands, plus storage for fire flows
4. Firm pumping capacity to meet Maximum Day Demands
5. Future fire flow capability of 1,000 for residential and 1,500 for commercial

4.1 Water Supply

The city faces three potential scenarios for water supply in the near future. 1) Remain with the City of Detroit system; 2) complete the upgrades to the city water plant and use the Flint River as the water source; or 3) participate in the Karegnondi Water Authority, which will use water from a new Lake Huron intake near Sanilac, Michigan and supply raw water to several communities including Flint and Genesee County. The city has determined that the long-range plan for water supply will either be scenario 2 or 3 above, which will require the operation of the water plant on a full-time basis. The reliability study will analyze the needs of the distribution system including P.S. No. 4, the high service pumping facility located on the water plant grounds.

4.2 Water Storage Facilities

There are several ways to evaluate water system storage. One commonly accepted method is that the system should have two times average day flow, plus fire flow storage. The city's current average day flow is 14.04 MGD, therefore the calculated system storage requirement would be 28.1 MG plus fire flow storage. Assuming simultaneous residential and industrial fires at 1,000 gpm and 1,500 gpm respectively, and a fire duration of four hours, fire storage calculates to an additional 600,000 gallons of storage. Required system storage would be 28.7 MG.

The table below shows the existing storage facilities in the City of Flint. The total storage available in the system is 57 MG located in three different areas of the city. The total system storage exceeds the required storage by just over 28 MG. While excess storage is sometimes advantageous from an operational stand point, the city currently has two times the required storage and is facing declining population, declining water use and declining revenues.

Table 11: City of Flint Storage Facilities

Location	Type	Capacity (gallons)	Overflow Elevation
Dort Reservoir	Ground	20,000,000	774.3
Cedar Street Reservoir	Ground	20,000,000	757
West Side Reservoir	Ground	12,000,000	779
Clear Well 3	Ground	3,000,000	724
Plant	Elevated	2,000,000	898

4.3 Water Pumping Facilities

The Ten State Standards requires that at least two pumping units be provided at each facility. With any pump out of service, the remaining pump or pumps shall be capable of meeting the maximum pumping demand of the system. Therefore we have used the following criteria in evaluating the system:

- The firm pumping capacity should provide projected Maximum Day Demand and fire flow of 2,500 gpm for four hours.

A. Pump Station 4

Pump Station 4 is located at the Dort Reservoir on the WTP grounds. The station currently has a total of five pumps, two of which are inoperable. The station's total capacity is 46 MGD with firm capacity of 26 MGD. Table 12 shows the pump characteristics for the operable pumps. The operable pumps were installed in 1994 and are now 19 years old.

Table 12: Pump Station 4 Facility

Pump No.	Design Capacity (MGD)	Type	Design Head (feet)
7	20	Turbine	185
8	20	Turbine	185
9	6	Turbine	185

B. Cedar Street Pumping Facility

Cedar Street Pumping Facility is located in the southern portion of the city on Cedar Street near Court Street. The station consists of three pumps, with a total capacity of 30 MGD and a firm capacity of 18 MGD. The station was constructed in 1948 and the existing equipment is all 1948 vintage. The station has exceeded its design life and has been scheduled for rehabilitation for several years. Table 13 shows the pump characteristics of the Cedar Street Pumping Station.

Table 13: Cedar Street Pump Facility

Pump No.	Capacity (MGD)	Pump Type	Motor Horsepower (HP)
1	12	Centrifugal	160
2	9	Centrifugal	160
3	9	Centrifugal	160

C. West Side Pump Station

West Side Pump Station is located on the west side of the city on Pershing Street. The station consists of four pumps, with a total capacity of 24 MGD and a firm capacity of 16 MGD. The pump station's four pumps were installed in 1970 and are now 40 years old. The pumps are approaching their design life of 50 years. The pump station has been scheduled for check valve upgrades for several years. Table 14 shows the pump characteristics of the West Side Pumping Station.

Table 14: West Side Pumping Station

Pump No.	Capacity (MGD)	Pump Type	Motor Horsepower (HP)
1	8	Turbine	142
2	8	Turbine	142
3	4	Turbine	142
4	4	Turbine	142

D. Torrey Road Booster Station

Torrey Road Booster Station is located on Hammerberg Road south of the Cedar Street Facility. The station consists of two pumps, with a total capacity of 6.8 MGD and a firm capacity of 2.8 MGD. The station is vintage 1954 and at 56 years of age, has exceeded its design life. The station has been scheduled for rehabilitation or replacement for several years. Table 15 shows the pump characteristics of the Torrey Road Pumping Station.

Table 15: Torrey Road Pump Facility

Pump No.	Capacity (MGD)	Pump Type	Motor Horsepower (HP)
1	4	Centrifugal	65
2	2.8	Centrifugal	100

Table 16: City of Flint Total Pumping Capacity Analysis

Pumping Station	Number of Pumps	Pumping Capacity (MGD)	Firm Capacity (MGD)
Dort (P.S. No. 4)	3	46	26
Cedar Street (P.S. No. 3)	3	30	18
West Side (P.S. No. 5)	4	24	16
Torrey Road	2	6.8	2.8
Total Pump Capacity		106.8	62.8

The City of Flint currently has a total pumping capacity of 106.8 MGD and a firm capacity of 62.8 MGD. Typically water systems have sufficient firm capacity to meet projected maximum day and the necessary storage to meet peak hour. The City of Flint currently has an observed maximum day of 26.38 MGD, which occurred in 2007. The observed maximum day for 2008 and 2009 were 18.66 MGD and 21.57 MGD respectively, and are significantly less than the 2007 figure. Based on projections shown in Table 17 below, the maximum day demand will continue to decline for the foreseeable future. The projected maximum day for 2010 is 26.2 MGD and based on that, the city has almost two and half times the firm capacity required to meet the needs of its customers.

Table 17: City of Flint Future Population and Water Usage Projections

2010	118,465	36,067	1,735	37,802	8,078		18,319		24,235	
2015	115,481	35,159	1,691	36,850	7,875	0.975	17,858	0.975	23,624	0.975
2020	112,234	34,170	1,644	35,814	7,653	0.972	17,356	0.972	22,960	0.972
2025	109,865	33,449	1,609	35,058	7,492	0.979	16,990	0.979	22,475	0.979
2030	107,663	32,778	1,577	34,355	7,342	0.980	16,649	0.980	22,025	0.980

Population projections from Genesee County Metropolitan Alliance
Information shown is for City of Flint only

4.4 Water Distribution System

As noted in Section 1.1 E, much of the City of Flint water distribution system is over 70 years old and is in need of rehabilitation or replacement. In addition, there is a significant amount of 4" watermain in the system that is over 70 years old, prone to watermain breaks, and unable to provide modern pressures and fire flows. The 20-year plan for the water distribution system is twofold: 1) rehabilitate or replace the primary transmission system that serves the city and 2) abandon 4" watermains where there is a suitable parallel main, or replace the 4" watermains with 8" in other cases.

4.5 System Pressures

The Ten States Standards recommends the following criteria for water systems:

- A minimum working pressure of 20 psi
- A normal working pressure of 60 to 80 psi
- Pressure reducing valves are to be provided when static pressures exceed 100 psi

In general, accepted minimum and maximum working pressures are 20 and 100 psi, respectively. Pressures below 20 psi do not provide adequate working pressure for firefighting needs and pressures in excess of 100 psi increase the risk of watermain breaks, and can cause issues in residential plumbing installations.

The city system generally operates between 40 and 75 psi and provides all customers with adequate flows and pressures to meet normal demands. Fire flow and pressure are substandard in some areas due to undersized mains and this has been addressed in the water distribution 20-Year Capital Improvement Program.

4.6 Emergency Back-up Water Supply

As discussed in Section 1.1 B, the City of Flint emergency backup water supply system is provided by the 36 MGD Water Treatment Facility located at Dort and Stewart. The facility has been recently rehabilitated and upgraded and can meet the city's current maximum day of 26.4 MGD and projected maximum day demands for the 2010 – 2020 study period. However, an estimated $25,000,000 of upgrades are planned to provide additional capacity and water softening.

In addition, Genesee County has requested 8 MGD in emergency backup water supply that would be delivered from Pump Station 4 to a point on the northern limits of the city, most likely in the Dort and Carpenter area. From that point the county would construct watermain and pressure boosting facilities to supply water to the GCDC-WWS system.

A. Standby Power Availability

The Flint Water System includes three pumping facilities that provide additional pumping to meet daily peak flow demands. These facilities are Cedar Street, West Side, and Torrey Road and the pumping capacities are listed in Tables 12, 13, and 14. The facilities currently do not have any standby power. The goal is to provide sufficient standby power to meet average day demands of the city in the most cost-effective manner.

West Side Station has a firm capacity of 26 MGD; Cedar Street Station has a firm capacity of 18 MGD; and Torrey Road has a firm capacity of 2.8 MGD. The current average day demand is 14.04 MGD and Cedar Street most closely matches firm capacity to average day demand. Therefore, it is

recommended that a standby generator be provided at the Cedar Street Facility in the event that the city remains on the DWSD system.

4.7 Distribution Model

The distribution model developed for this study was created from City of Flint GIS data using MWHSoft's InfoWater modeling software, an ESRI ArcView, GIS-based water modeling package. The model was updated to include water infrastructure improvements that have been completed since the previous model update in 1999-2000. The GIS-based model also provides the ability to include additional geographical information in the model such as valve locations, streets, parcel maps, contours, etc.

4.8 General

Water modeling is a computer simulation of water system infrastructure and demands. Water modeling can identify deficiencies in a system and evaluate the impact of alternatives for improvements. The parameters used for determining improvements include such items as providing adequate fire flows, increasing system reliability, serving future customers, maintaining a residual pressure of 40 psi or greater during PHD conditions, and evaluating system pumping and storage needs.

Water systems are analyzed, planned and designed through the application of basic hydraulic principles. Some important factors which must be considered when performing this analysis include:

- The location and size of supply facilities
- The location, size, and design of storage facilities
- The location, type, magnitude and variability of customer demands
- Water system geometry and geographic topography
- Minimum and maximum pressure requirements
- Anticipated fire flow requirements
- Land use

4.9 Hydraulic Water Model

The model is set up to simulate the existing City of Flint Water System as accurately as possible within the frame work of the software. Because the city operates the water system manually, the control schemes included in the model are limited and each run should be set to mimic specific boundary conditions including: pressure from Detroit; which pumps are on or off; GCDC demands; and appropriate tank and reservoir levels. The water model includes demand scenarios for the existing AAD, MDD, and PHD and projected demands for every five year increment from 2010 to 2030.

4.10 Physical Characteristics

The existing water distribution system facilities have been modeled using design information provided by the city. The model includes detailed information about the water system infrastructure including pipe

size, pipe length, c-factor, node elevations, pump curves, and tank and reservoir sizes. This information was collected from the city's GIS, City of Flint blue prints, and meetings with city staff.

4.11 Demand Allocation

The City of Flint demands were allocated in several ways depending on the information available and the level of potential impact on the accuracy of the model. Six sets of demands are included in the model:

1. Residential demands were developed from residential billing data and divided across the model;
2. Commercial/Industrial accounts with meters 2" and larger were analyzed for one year of data and the demand placed at the closest node to the account;
3. GCDC demands were developed using actual meter data from GCDC and City of Flint;
4. Small commercial demands were developed from billing data and spread across the system;
5. Unaccounted for water was analyzed in Table 6 and applied across the system.

4.12 Water Model Calibration

Model calibration is the process of evaluating the data incorporated into the model against real world flows and pressures in the water system. The accuracy of the process will vary depending on the accuracy of the information input to the model; the age and complexity of the water system; the accuracy of the boundary conditions; and the accuracy of the field data that is collected for calibration. The level of calibration accuracy that is required varies with the type of analysis being carried out. For the purposes of this study. values plus or minus 10 percent of field values were considered acceptable. The water model was calibrated using flow test information from the City of Flint conducted in the fall of 2009. The flow test sites were spread geographically across the system.

4.13 System Configuration Alternatives

A. Water Supply

Water supply and the water plant will be evaluated in a separate report.

B. Water Pumping and Storage Facilities

The existing City of Flint water system was designed to service a much larger population and significantly more industry than is currently being served. Steadily declining population, declining water demands, a much smaller General Motors presence, and GCDC-WWS's construction of out-county pumping and storage facilities have gradually reduced the demands on the city's water infrastructure. In addition, many of the city facilities are at or are reaching their design life and are poised to impact the water system budget and fund balance. There is significant excess pumping and storage in the system and some of this can be eliminated without impacting flows and pressures while lessening the burden on the budget and maintenance staff. The pump and fill ground storage system that the city operates is energy-intensive and additional elevated storage, that does not require additional pumping, is included in one of the scenarios. Based on these factors, three alternatives were

developed for the 20-Year Capital Improvement Program. The first alternative would keep the city water system as it is currently and provides a number of potential future configurations. The second alternative examines operating the system with the water plant as the source of water. The third alternative provides a preliminary view of the city and county combining the water systems and operating as one system.

1. Existing System Configurations

In the existing mode of operation, the city operates off DWSD line pressure to feed the round storage tanks in the system and then pumps from Cedar Street and West Side to meet peak demands. The City of Flint water system currently has excess pumping and storage capacity that is reaching its design life, costly to maintain, and not required in order to meet the design standards for the system. The following five tables show various configurations that would meet the system demands while reducing operating costs and facility upkeep costs.

Table 18: City of Flint Existing System Analysis

Current Demands				
Average Annual Day	14.04	MGD		
Max Day	26.38	MGD		
Peak Hour	42.12	MGD		
Required Storage				
Fire Flow	0.60	MG		
System	28.08	MG		
Total	**28.68**	**MG**		
System Storage				
Dort Reservoir	20	MG		
Clear Well 3	3	MG		
Elevated	2	MG		
Cedar Street	20	MG		
West Side	12	MG		
Total Storage	**57**	**MG**		
Pumping Capacity	Total		Firm	
Dort (P.S. No. 4)	46	MGD	26	MGD
Cedar Street	30	MGD	18	MGD
West Side	24	MGD	16	MGD
Torrey Road	6.8	MGD	2.8	MGD
Total Pumping	**106.8**	**MGD**	**62.8**	**MGD**

Table 19: City of Flint Existing System Analysis Cedar Street out of Service

Average Annual Day	14.04	MGD		
Max Day	26.38	MGD		
Peak Hour	42.12	MGD		
Fire Flow	0.60	MG		
System	28.08	MG		
Total	**28.68**	**MG**		
Dort Reservoir	20	MG		
Clear Well 3	3	MG		
Elevated	2	MG		
West Side	12	MG		
Total Storage	**37**	**MG**		
Dort (P.S. No. 4)	46	MGD	26	MGD
West Side	24	MGD	16	MGD
Torrey Road	6.8	MGD	2.8	MGD
Total Pumping	**76.8**	**MGD**	**44.8**	**MGD**

Table 20: City of Flint Existing System Analysis West Side out of Service

Average Annual Day	14.04	MGD		
Max Day	26.38	MGD		
Peak Hour	42.12	MGD		
Fire Flow	0.60	MG		
System	28.08	MG		
Total	**28.68**	**MG**		
Dort Reservoir	20	MG		
Clear Well 3	3	MG		
Elevated	2	MG		
Cedar Street	20	MG		
Total Storage	**45**	**MG**		
Dort (P.S. No. 4)	46	MGD	26	MGD
Cedar Street	30	MGD	18	MGD
Torrey Road	6.4	MGD	2.9	MGD
Total	**82.4**	MGD	**46.9**	MGD

Table 21: City of Flint Existing System Analysis Cedar Street and Torrey out of Service

Average Annual Day	14.04	MGD		
Max Day	26.38	MGD		
Peak Hour	42.12	MGD		
Fire Flow	0.60	MG		
System	28.08	MG		
Total	**28.68**	**MG**		
Dort Reservoir	20	MG		
Clear Well 3	3	MG		
Elevated	2	MG		
West Side	12	MG		
Total Storage	**37**	**MG**		
Dort (P.S. No. 4)	46	MGD	26	MGD
West Side	24	MGD	16	MGD
Total Pumping	**70**	**MGD**	**42**	**MGD**

Table 22: City of Flint Existing System Analysis West Side and Torrey out of Service

Average Annual Day	14.04	MGD		
Max Day	26.38	MGD		
Peak Hour	42.12	MGD		
Fire Flow	0.60	MG		
System	28.08	MG		
Total	**28.68**	**MG**		
Dort Reservoir	20	MG		
Clear Well 3	3	MG		
Elevated	2	MG		
Cedar Street	20	MG		
Total Storage	**45**	**MG**		
Dort (P.S. No. 4)	46	MGD	26	MGD
Cedar Street	30	MGD	18	MGD
Total	**76**	**MGD**	**44**	**MGD**

2. Full-Time Water Plant Operation

This alternative examines the system configuration with the water plant operating as the main supply source for the city. The two alternatives for water supply are either from the Flint River or raw water from the Karegnondi Water Authority (KWA). In this alternative, the city would use the high service pumps at Pump Station 4 located on the water plant grounds to feed the system. Two of the existing pumps have been abandoned, and the remaining three are over 16 years old and are not sized to efficiently supply the system with water. The five pumps at Pump Station 4 should be replaced with appropriately sized pumps to meet current and future demands and the associated piping and electrical equipment upgraded as necessary.

As noted in Section 1 above, West Side Storage and Pumping Facility and Cedar Street are operated on alternative days to meet peak demands. This operating configuration is reasonable with the existing water supply system operating off DWSD pressure during nonpeak periods. However, with the water plant operating full-time re-pumping water from Cedar and West Side to meet peak demands this may not be the most efficient way to operate the system. Proposed elevated storage located on the south end of the city allows the water to be pumped from Pump Station 4 through the system, filling the tanks and the elevated storage tanks and providing peak hour supply and fire protection without additional pumping.

Table 23: West Side, Torrey, and Cedar out of Service - 2 New Elevated

System Demands			
Average Annual Day	14.04	MGD	
Max Day	26.38	MGD	
Peak Hour	42.12	MGD	
GCDC Backup			
Required Storage			
Fire Flow	0.60	MG	
System	28.08	MG	
Total	**28.68**	**MG**	
Water Stored			
Dort Reservoir	20	MG	
Clear Well 3	3	MG	
Elevated	2	MG	
Proposed Elevated	2	MG	
Proposed Elevated	2	MG	
Total Storage	**29**	**MG**	
Pumping Capacity	Total		Firm
Proposed Dort (P.S. No. 4)	64	MGD	48

3. Combine the city system with the GCDC-WWS system.

   Genesee County surrounds the City of Flint and has significant water infrastructure in place. There have been discussions between the parties regarding interconnects for the mutual aid of both water systems during emergencies. Interconnecting the systems for daily use could also have mutual benefit to both parties. The county has 3 MG of elevated storage with overflow elevations at 930 and 940, and a pumping facility in close proximity to the hospital district which could meet peak demands and aid in the elimination of the Torrey Booster. The city has the backup water plant that is capable of providing 36 MGD in the case of an extended shut down of the 72" transmission main from Port Huron. There are numerous configurations for combining the two systems, and an in-depth analysis of the two systems could result in capital and operating savings to both systems. The following table illustrates one possible configuration.

Table 24: West Side, Torrey, and Cedar out of Service - Use County Houran Facility

System Demands				
Average Annual Day	14.04	MGD		
Max Day	26.38	MGD		
Peak Hour	42.12	MGD		
Required Storage				
Fire Flow	0.60	MG		
System	28.08	MG		
Total	**28.68**	**MG**		
System Storage				
Dort Reservoir	20	MG		
Clear Well 3	3	MG		
Elevated	2	MG		
Houran	2			
Total Storage	**27**	**MG**		
Pumping Capacity	Peak		Max	
Dort (P.S. No. 4)	46	MGD	26	MGD
Houran	9	MGD	6	MGD
Total	**46**	MGD	**26**	MGD
Upgrade P.S. No. 4 for flexibility and reliability (2 - 8 mgd and 3 - 16 mgd)				
Use County Houran Storage Facility and Pumping				

C. Water Distribution System

There are a number of improvements identified in the 20-Year Capital Improvement Plan. Water modeling and discussions with the city resulted in the following 20-year CIP.

Project Number	Capital Improvement Projects	Design Schedule	Construction Schedule	Project Construction Cost	Project Contingency (35%)	Total Project Cost
	Major Booster Station Improvement Projects					
1	Torrey Road Booster Upgrades (In-house)	Design Complete	Construct 2010	$300,000	$141,000	$441,000
2	Water Pumping Station 3 Electrical and Controls Upgrade	Design in progress	Construct 2010	$900,000	$423,000	$1,323,000
3	Pump Station 4 Improvements	Design 2012	Construct 2013	800,000	$376,000	$1,760,000
	Sub Total			**$2,000,000**	**$940000**	**$2,940,000**
	Major Transmission System Improvement Projects					
4	28,000 LFT of 24" watermain, WTP to Dupont; South to University	Design Complete	Construct 2011	$10,000,000	$4,700,000	$4,410,000
5	15,500 LFT of 12" watermain; Saginaw Street, Flint River to Pierson Road	2010	2012	$3800,000	$1,786,000	$5,586,000
6	16,100 LFT of 12" watermain; Atherton Road, Van Slyke to Dort	2010	2013	$4,000,000	$1,880,000	$5,880,000
	Sub Total			**$18,800,000**	**$8,366,000**	**$31,166,000**
	Minor Transmission System Improvement Projects					
7	500 LFT of 6" watermain; Hamilton Ave, Mason St to MLK Blvd.	2010	2011	$50,000	$23,500	$73,500
8	1,650, LFT of 6" watermain; Sonny Ave, Dupont to Lawndale	2010	2011	$165,000	$77,550	$242,550
9	1500 LFt of 6" watermain; Walton St, Clairmont to Augusta	2010	2012	$150,000	$70,500	$220,500
10	1500 LFt of 6" watermain; East Blvd, Farmers Market to Park	2011	2013	$150,000	$70,500	$220,500
11	325 LFT of 6" watermain; Alexander Street, Taylor to Rankin	2011	2014	$32,500	$15,275	$47,775
12	1075 LFT of 6" watermain; Mack Street, Clio Road to Winona	2011	2015	$122,500	$57,575	$180,075
	Sub Total			**$670,000**	**$314,900**	**$984,900**
	System Maintenance Improvements					
13	Water Meter Replacement Program 3,000 meters/year		2010-2015	$3,000,000		$15,000,000
14	Hydrant Replacement Program 3,000 meters/year		2010-2030	$500,000		$10,000,000
15	Valve Replacement Program 3,000 meters/year		2010-2030	$250,000		$5,000,000
15	SCADA Improvements	2011	2012-2013	$250,000		$250,000
	Total CIP Costs			**$25,470,000**	**$9,620,000**	**$35,090,900**

4.14 Construction Costs

ROWE has compiled "Engineer's Opinion of Probable Construction Costs" for the water system improvements. The following considerations were made in compilation of the costs.

- ROWE assumed the cost estimates for all watermain also included the costs for installing:
  - Hydrants
  - Valves
  - Gate wells
  - Taps
  - Corporations, curb stop and boxes
  - All fittings (bends, tees etc.)
- ROWE assumed the water service leads were not included in the cost estimates. The cost for the service leads should be included in the proposed development construction costs.
- ROWE assumed pavement removal and replacement would occur for 60% of the watermain installed, while 40% would be installed in non-paved areas.
- ROWE assumed a 20% contingency of the total construction costs to account for any unforeseen construction costs including, but not limited to, bore and jack installations, de-watering, and poor soil conditions.
- ROWE assumed the surveying, engineering, legal and administration costs would be 20% of the total construction costs.
- ROWE completed cost estimates using 2004 dollars, and applied an inflation rate of 2% per year.
- ROWE did not include costs for obtaining easements, since there was no consideration of detailed watermain routing in this study. This should be performed during the design phase of the proposed improvements.
- ROWE did not include costs for time and effort by City of Flint personnel.
- ROWE assumed the DWSD could provide an adequate amount of water to meet all Flint water demands for all conditions.
- ROWE did not include costs for 3-phase electrical service

Section 5 - Recommendations

The City of Flint has indicated that its goal is to operate the system with the Flint Water Plant as the source of water and withdraw from the DWSD system. The water source for the treatment plant may be the Flint River or raw water from KWA. The following recommendations are based on this decision and are listed in order of importance.

5.0 Water Efficiency

The city's current water efficiency is 65%. Typically water utilities operate at 85-90% efficiency. An increase to 85% efficiency would result in increased revenues in the range of $1.5 million to $3.0 million annually.

Key tasks:

- Large meter testing program
- Meter replacement program
- Water billing system audit
- Watermain break and leak analysis study
- Repair, replacement, or reconditioning of those assets found to be in disrepair

5.1 Water System Storage and Pumping Capacity

The current water system has twice the storage and pumping capacity that is needed to operate the system. A number of options to reduce pumping and storage have been identified. Implementing these operational changes going forward will allow the city to operate more cost effectively and concentrate on upgrading and maintaining key infrastructure.

Key Tasks:

- Review scenarios and reduce pumping and storage
- Upgrade those facilities that are retained to operate more efficiently

5.2 Capital Improvement Programs

The Water Reliability Study outlines a number of potential capital improvements that may be constructed over the next 20 years. These capital improvements should be evaluated more closely as the city moves forward with changing water supplies. The priority of the capital improvements will change depending on the direction that the city chooses for water supply.

Key Tasks:

- Revise and reprioritize CIPs based on outcome of water supply decision

5.3 Valve Replacement Program

A $500,000 annual valve replacement program has been outlined in the Water Reliability Study. The replacement program concentrates on the most critical valves and putting in place a system to upgrade all valves over time.

Key Tasks:

- Implement Valve Replacement Program

5.4 Hydrant Replacement Program

A $250,000 annual Hydrant Replacement Program has been outlined in the Water Reliability Study. The program concentrates on the oldest hydrants first, and puts in place a long term program to upgrade all hydrants in the system over time.

Key Tasks:

- Implement Hydrant Replacement Program

5.5 Water System Automation

Supervisory Control and Data Acquisition (SCADA) - Modern water utilities operate more efficiently and with lower labor costs by using SCADA to operate and analyze the water system and its operation.

Key Tasks:

- Evaluate and upgrade water system SCADA system
- Develop CIP costs to upgrade SCADA system
- Look at interoperability with GCDC-WWS SCADA system

5.6 GIS-Based Asset Management

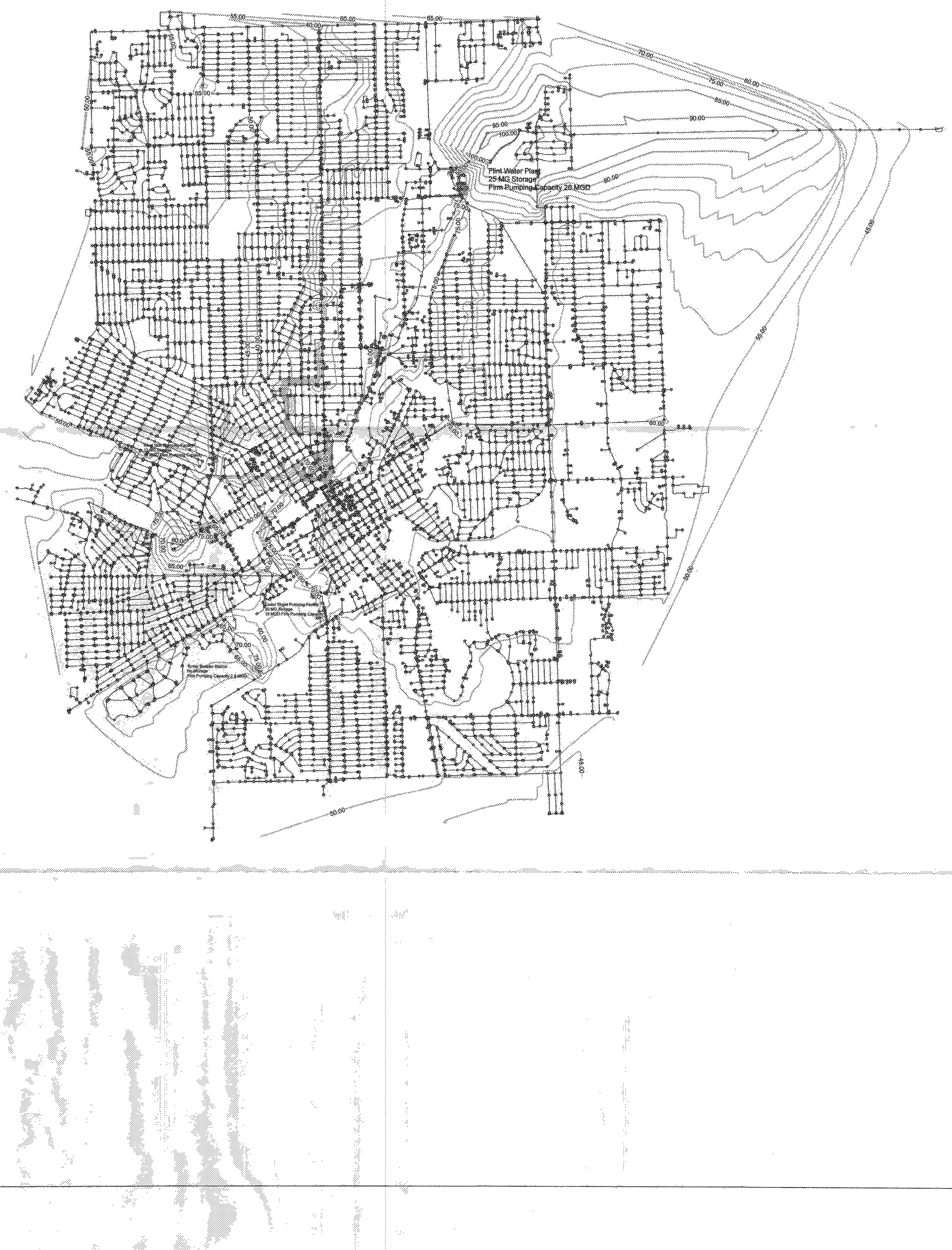
One key to operating and maintaining a water system is identifying which assets are fundamental to operating the system, which require the most maintenance, and which are most likely to fail and what the effect of that failure will be. GIS-based work management and asset management systems provide the tools to easily perform these types of analyses and apply them to the system to make the most cost-effective capital improvements. The city has the basic GIS tools and water and sewer modeling software.

Key Tasks:

- Evaluate the various software packages
- Purchase software
- Implement software

DEQ
RESOURCE MANAGEMENT DIVISION
JAN 14 2016
LANSING DISTRICT

City of Flint Water System
Average Day Pressure Contours
August 2011



June 7, 2012

I received a media inquiry from Mr. Ron Fonger from the Flint Journal concerning the city of Flint and the potential of blending treated water from the Flint River or Lake Huron with water purchased from Detroit. A summary of our discussion is provided below.

Q1. What permits or approvals are needed before Flint can make a large withdrawal (enough to be a source of drinking water) from a river?

A: The Karegnondi Water Authority (KWA) is required to obtain a Large Quantity Water Withdrawal Permit. This permit has already been obtained. The city of Flint; however, does not need to acquire a water withdrawal permit for use of the Flint River since the city already has an established baseline of 90 MGD. This was based upon fulltime operation of the Flint WTP and its pumping capacity prior to purchasing water from Detroit.

Q2: Will the DEQ allow Flint to blend water from the Flint River or from Lake Huron with water purchased from Detroit?

A: The city of Flint may elect to blend treated water from either source provided that the finished water quality distributed to the city Flint is comparable to the water currently purchased from Detroit. The finished water must meet all applicable drinking water standards.

Q3: What specific standards would need to be met?

A: The WTP must produce water that meets the turbidity standards and provides adequate disinfection contact time through the treatment process. I explained to Mr. Fonger the meaning of turbidity (the degree of clarity in the water) and that increased turbidity correlates to less effective treatment (removal of suspended particulates) which ~~will threaten~~ the bacteriological integrity of the treatment process and the ~~entire~~ water system. The WTP's finished water must also maintain a minimum chlorine residual as it enters Flint's distribution system.

Q4: As long as the drinking water standards are being met, does it matter whether Flint blends raw water from the Flint River or KWA with Detroit water first followed by subsequent treatment …or….treat the raw water first and blend it with Detroit water?

A: The most sensible sequence is to treat water from the Flint River and/or KWA followed by ~~subsequent~~ blending of water purchased from Detroit. This is the blending sequence that the city may consider.

Q5: Does the intake need to be permitted?

A: The Flint WTP has an existing intake in the Flint River; thus a new intake most likely does not need to be constructed. Other infrastructure improvements; however, will be needed ~~at and near the Flint WTP to accommodate blending Detroit water with treated water from the Flint River and/or KWA~~ and include;

new transmission piping, pumping stations, and treated storage. These and other improvements will require approval and issuance of a construction permit from our office.

Q6: Are there other communities in Michigan that blend water?

A: The city of Lansing and East Lansing (E. Lans-Meridian Water & Sewer Authority and Lansing Board of Water & Light) blend softened groundwater. Also, Ira Township and New Baltimore blend treated surface water. Each community; however, treats their own source of water prior to blending.

End of inquiry

Prysby, Mike (DEQ)

From: Fonger, Ronald <Ronald_Fonger@mlive.com>
Sent: Tuesday, June 05, 2012 2:03 PM
To: Prysby, Mike (DEQ)
Subject: questions regarding blending water

Mike:

What permits or approvals are needed before a community can make large withdrawls (enough to be a source of drinking water for a community) from a river?

Are there any permits or approvals required to blend water from a river with either treated or untreated water from Lake Huron?

Are any communities in the state currently blending water?

Ron Fonger
RFONGER1@mlive.com
810.347.9963

KWA Meeting Agenda

Feb 8, 2013

1. **Introductions** — See notes

2. **Intake Project Bidding/Bonding** — see notes

3. **Final Bid Doc./Corp Permit to MDEQ** — MAY/JUNE (NA open-cut)
   ∴ modified permit → CAN get to us ∴ open cut work July in 2013
   ✓ tunnel pace good – may like to do, CAN we claim → MANWAY

4. **Latest DWSD Offer**

5. **Status of Flint Joining KWA**

6. **Design Team – Intro**

7. **2009 KWA Report/List of Committed Participants**

8. **Project Timelines - design engineering, entire timeline**

9. **Bonding Timeline**

10. **Preliminary Design issues & Potential design from 2009 report** - Dist of add from
2009 — Proj. MGRs doing updates for submittal (KWA only)

11. **Design Criteria – final submission & final revision of 2009 KWA report**

12. **Use of Raw Water in Agricultural Food Processing**

13. **Close**

BQ Books 51 FNT 58 BA

BQ Books 99

2011 Drinking Water Infrastructure Needs Survey and Assessment

User: brysbym@michigan.gov Role: State

System View

The System View shows detailed information on a specific water system. This page has four tab sections. The **Projects** tab shows all of the projects submitted by the water system. The **Details** tab shows water system specific information, including the water system's address, and water system contact information. The **Tracking** tab shows the history of the selected survey after the survey was returned. The tracking includes information such as where the survey has been located since it was returned, what phases of the upload process the survey has been through, and which analysts worked on each phase. The **Projects Table** tab shows all of the projects submitted by the water system in a view similar to the original paper survey pages.

Current Filters

Project: All Projects; Not Processed; Deleted; Accepted w/no Cost; Accepted w/Adjusted Cost; Accepted w/Cost

System: System Filter: Not Applicable

Area Filter Not Applicable

Apply <-- Hit the apply button to save (and see) changes

Projects | Details | Messages | Tracking | Projects Table

PWSID: MI0002310
Water System Name: FLINT, CITY OF
System Status: 103 - System did not complete inventory information
88 - Correction made to system information (name, address, ownership, population, connections, capacity or source)

Project Number	Project Name	Type of Need	Reasons for Need	New, Replace, Rehabilitate or Expand	Current or Future	Reg. or Sec. Purpose	Design Capacity	Diameter	Length	Number Needed	Cost Estimate	Date of Cost	Documentation
1000	TREATMENT PLANT PROCESS SCADA	W2	A1	R	F	4A					$978,000.00	9/2011	2, 10
1001	WTP EXP	T10	A1	E	F	4A					$40,258,000.00	9/2011	2, 10
1002	PS3 PUMP #1 REPLACE	M99, P1	A1, A4	R	F	4A	8			1			20
1003	PS3 PUMP #2 REPLACE	M99, P1	A1, A4	R	F	4A	12			1			20
1004	PS3 PUMP #3 REPLACE	M99, P1	A1, A4	R	F	4A	18			1			20
1005	PS3 STAND-BY POWER	M99, W4	A11	N	F	4A	20			1			10, 20
1006	PS3 STAND-BY POWER	M99, W4	A11	N	F	4A	20			1			10, 20
1007	REPLACE SWITCHGEAR @ PS5	P2	A1										
1008	REHAB TORREY RD BOOSTER STA.	P2	A1	H	C	4A				1	$241,000.00	7/2011	2, 3, 10
1009	CEDAR ST. RESERVOIR REHAB	S2	A1	H	F	4A	20 MG			1			20
1010	WEST SIDE RESERVOIR REHAB	S2	A1	H	F	4A	12 MG			1			20
1011	PUMP STATION 5 REHAB	P2	A1	H	F	4A	24 MGD			1			20
2000	UPGRADE 3-FOOT & 4-INCH MAINS WITH 8-INCH	M1	A1	R	C	4A			[illegible]		$12,000,000.00	2/2007	20
2001	REPLACE CRITICAL 8-INCH MAINS WITH 8-INCH	M1	A1	R	C	4A			[illegible]		$1,000,000.00	2/2007	20
2002		M1	A1	N	C	4A		8	5025				10

	LOOP EXISTING 6-INCH MAINS WITH 8-INCH								3025					
2003	LOOP EXISTING 12-INCH MAINS	M1	A1	N	C	4A		12	800					10
2004	REPLACE EXISTING 6-INCH MAINS WITH 8-INCH	M1	A1	R	C	4A		8	91000 ft					20
2005	REPLACE 8-INCH MAINS	M1	A1	R	C	4A		8	45500 ft					20
2006	REPLACE 10-INCH & 12-INCH MAINS WITH 12-INCH	M1	A1	R	F	4A		12	15600 ft					20
2007	REPLACE 14-INCH AND 16-INCH MAINS WITH 16-INCH	M1	A1	R	F	4A		16	10400 ft					20
2008	REPLACE 16-INCH MAINS	M1	A1	R	F	4A		16	4160 ft					1,2,20
2009	REPLACE 24-INCH MAINS	X2	A1	R	C			24	7800 ft					20
2010	REPLACE 30-INCH MAINS	X2	A1	R	C			30	1040 ft					20
2011	REPLACE 36-INCH MAINS	X2	A1	R	C	4A		36	715 ft					20
2012	LOOP EXISTING 8-INCH MAINS	M1	A1	N	C	4A		8	400					10
2013	REPLACE 42-INCH MAINS	X2	A1	R	F	4A		42	95 ft					20
2014	REPLACE 72-INCH MAINS	X2	A1	R	C	4A		72	3744 ft					20
3000	REPLACE RESIDENTIAL METERS	M8	A1	R	C	4A		0.625		32931				10
3001	REPLACE RESIDENTIAL METERS	M8	A1	R	C	4A		1		471				10
3002	REPLACE RESIDENTIAL METERS	M8	A1	R	C	4A		1.5		383				10
3003	REPLACE RESIDENTIAL METERS	M8	A1	R	C	4A		2		28				10
3004	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		0.625		439				10
3005	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		1		281				10
3006	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		1.5		350				10
3007	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		2		388				10
3008	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		3		107				10
3009	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		4		71				10
3010	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		6		47				10
3011	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		8		3				10
3012	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		10		6				10
3013	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		16		1				10
3014	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		24		1				10
3015	LEAD SERVICE REPLACEMENT	M2	A1, A6	R	C	1D		1		18000				10
3017	OTHER SERVICE LINE REPLACEMENT	M2	A1	R	F	4A		1		3206				10
3018	REPLACE SERVICE LINES > 1-INCH	M2	A1	R	F	4A				275				10

Total	$3,776,000	61.7 %	$2,329,000

292,786 LF → 10%

- 102,500
- 10,000

180,286 61.7%

316,800

.645

8" - 69200' 10%
42700' 6.17%

10 & 12 Σ = 25,400 (10%)
15,076 6.17%

Replace 8" Mains 69200 * .617 = 42700 ≠ 45,500
69200 * .637 = 44,080 ≠ 45,500

Replace 30" Mains
16,183 LF total → 10% 1,618 LF

1,618 * .617 = 998 LF ≠ 1080
1,618 * .637 = 1030 LF ≠ 1080

Replace 24" Mains
116,177 LF → 10% 11,612 LF → 7,118 LF ≠ 7,800 LF
61.2%
63.7% → 7,396 LF ≠ 7,800 LF

Prysby, Mike (DEQ)

From: Busch, Stephen (DEQ)
Sent: Tuesday, February 12, 2013 3:24 PM
To: Prysby, Mike (DEQ); Cook, Pat (DEQ)
Cc: Bloemker, Jon (DEQ)
Subject: RE: KWA Bin Classification

Mike,

We can't give them a conclusive answer, but we can provide them with some confidence that 73 of 75 subH treatment systems (including all Great Lakes sources) have been classified Bin 1 and allow them to move forward with their WTP design basis which is what they were asking for. As you said the official answer won't come until they do the actual monitoring.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

From: Prysby, Mike (DEQ)
Sent: Tuesday, February 12, 2013 2:16 PM
To: Cook, Pat (DEQ)
Cc: Busch, Stephen (DEQ); Bloemker, Jon (DEQ)
Subject: RE: KWA Bin Classification

The only potential "fly in the ointment" could be the ground storage reservoir proposed to contain 7-10 days of storage. I would assume that crypto monitoring would be required at a location downstream of this impoundment prior to the WTP. The potential for problems at this location can be minimized depending on the nature of construction and how well it is managed. Also, samples for Crypto (representative of Lake Huron water) can't even be collected until the intake crib and low service station are constructed.

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 335-6122

From: Cook, Pat (DEQ)
Sent: Tuesday, February 12, 2013 12:55 PM
To: Busch, Stephen (DEQ)
Cc: Prysby, Mike (DEQ); Bloemker, Jon (DEQ)
Subject: RE: KWA Bin Classification

All Subpart H plants that use the Great Lakes as a source of raw water were classified as Bin 1. The only plants in the entire state that were classified in a higher Bin were Deerfield and Blissfield, which use the River

Raisin as a source. Deerfield opted out of the monitoring and volunteered to go to Bin 4. Blissfield was place in Bin 2.

I would be shocked if KWA was placed in any other Bin than 1, but we will not know for sure until they participate in the 2nd round of Crypto monitoring which starts in a few years.

Patrick Cook, P.E.
Community Drinking Water Unit
Office of Drinking Water & Municipal Assistance
Michigan Department of Environmental Quality
(517) 241-1242
cookp@michigan.gov

From: Busch, Stephen (DEQ)
Sent: Monday, February 11, 2013 3:49 PM
To: Cook, Pat (DEQ)
Cc: Prysby, Mike (DEQ); Bloemker, Jon (DEQ)
Subject: KWA Bin Classification

Pat,

We met with Genesee Co. today to go over the KWA project. One of the questions they had about the GCDC WTP was what bin classification they would fall into. We explained that no great lakes water intake has shown problems with crypto, but they would like some reassurance they won't be classified into something restrictive. Do you have a summary of the statewide LT2 data that we could forward to them?

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

Prysby, Mike (DEQ)

From: Donaldson, Kristina (DEQ)
Sent: Monday, March 25, 2013 3:12 PM
To: Shekter Smith, Liane (DEQ); Prysby, Mike (DEQ)
Cc: Bloemker, Jon (DEQ); Benzie, Richard (DEQ); Busch, Stephen (DEQ); Butler, Sonya (DEQ); Willard, Veronica (DEQ)
Subject: RE: Flint Scenarios

Here are my comments on the attached documents:

- Currently Flint receives water from DWSD and uses their water treatment plant as a back-up. Flint is currently in compliance with the SDWA as they stand with regard to reliability/redundancy. There is no regulatory reason for leaving the DWSD system. The issue of KWA vs. DWSD is mainly a question of cost.

- The February 2013 TYJT report indicates that there are economically viable options that would allow Flint to continue to receive water from DWSD. There is conflicting information on costs depending on the source, and I really don't know which cost estimates are most correct. If there is a cost effective option for Flint to stay on the DWSD system, it should be pursued.

    - If Flint leaves the DWSD system, there will be ~30 miles of unused water infrastructure. The cost of maintaining excess water infrastructure and capacity in the DWSD system will be the burden of the customers that remain on the DWSD system.

    - The DWSD system has already undergone a significant reduction in water demand that continues to hurt their bottom line. The loss of an additional customer will only exacerbate the problem.

- Small water systems that receive water from the DWSD on the Imlay to Flint transmission line will likely be left to build their own water system (Imlay, Mayfield, Greater Lapeer Utilities Authority).

With regard to Flint's representation/decision making authority:

- For the last 10 years, DWSD has implemented a customer outreach program open to all customers known as the Technical Advisory Committee (TAC). TAC has developed Partnering agreements to work together on decisions regarding the DWSD system. The TAC has worked with DWSD to develop the latest rate structure, capital improvements program, etc. Historically, Flint has chosen not to participate on the TAC, but could do so going forward to make sure they have a say in the decisions relating to the DWSD system.

- DWSD is currently working on converting to a water authority. This new structure could allow for a seat on the Board of Water Commissioners.

From: Shekter Smith, Liane (DEQ)
Sent: Friday, March 22, 2013 8:41 AM
To: Donaldson, Kristina (DEQ); Prysby, Mike (DEQ)
Cc: Bloemker, Jon (DEQ); Benzie, Richard (DEQ); Busch, Stephen (DEQ); Butler, Sonya (DEQ); Willard, Veronica (DEQ)
Subject: FW: Flint Scenarios
Importance: High

Kris and Mike –

Note the assignment below, due next Wednesday morning at the latest.

City of Flint Water Supply Assessment
Tucker, Young, Jackson, Tull Inc.
February 2013

MDEQ – LDO Comments

1. DWSD's most cost-effective option of 8 MGD maximum day from either the Imlay Station or from FL-1 in Table 6-1 clearly causes the Flint WTP to exceed the 2:1 DWSD – Flint River blending ratio during maximum day demand and the high usage months in the summer. The need to soften during higher usage from the Flint River will increase capital improvement costs and on-going operation/maintenance costs at the Flint WTP.

   Additional capital improvement include:

   - Repairs to lime slakers and lime storage silos
   - Disposal of lime sludge residuals – on site de-watering/filter press system
   - Potential for higher Cryptosporidium Bin classification from the Flint River which will require more advanced treatment (UV disinfection, etc).
   - Flint WTP is rated at 36 MGD. Existing components (pumps, treatment basins, chemical feed systems) may not be suitable for treating at very low rates (8.0 MGD or less).

   Additional operational costs include:

   - Additional treatment chemical cost – lime-soda ash for softening
   - Additional electrical usage for increased ozone generation and softening
   - Additional system monitoring for increased levels of disinfection by-products

   The TYJT report does not address these additional costs.

2. The Average Unit Cost of purchased water from DWSD presented in Table 4-2 is misleading since the annual change was based on a hypothetical rate that Flint would be been offered had they signed a new purchase contract with DWSD. The actual annual change (average) of water purchased from DWSD by Flint is approximately 10.5% based on a rate analysis conducted by Flint and their consultant.

Hendrie P.S. 30 MGD
– 2 WWTP PS.

3. The TYJT report projects the cost of the pumping stations at $71 million and is approximately $40 million higher than KWA's cost estimate. KWA, Flint, and their consultant ~~provide accurate~~ construction costs ~~that would support their cost estimate~~. We would agree with TYJT's experience of higher construction costs in the immediate Detroit metropolitan area due to local construction costs and and requirements; however, these higher ~~are not always~~ applicable in out-state areas.

4. In Table 5-5 TYJT's estimate of $71 million and $218 million for the pumping stations and transmission main respectively includes their 30% ELAC estimate. TYJT; however, includes an additional $32.5 million for further ELAC costs and increases the total ELAC costs to approximately 43%. It appears that the ELAC is being double-counted and a 43% ELAC seems unwarranted for a project having a significant amount of preliminary design engineering completed.

5. Page 19 of the TYJT report states that under the KWA option, two separate treatment process streams would need to be maintained for the Flint River as a back-up supply. This is not true. The Flint WTP ~~could~~ use their existing KWA treatment train to treat Flint River water; however, some of treatment processes would need to be adjusted (increase coagulant and disinfectant dosages).

6. TYJT states on Page 15 that approximately $7.1 million in capital improvements will be needed at the Flint WTP for the KWA option based on the 2009 KWA preliminary engineering report. A decrease in these costs (KWA option) is likely as some of the capital improvements are not critical in the WTP's operation. However, additional capital improvements are needed if the WTP is utilized as part of DWSD's most cost effective blending option (see Item #1).

7. Page 18 of the TYJT report offers a second pipeline to Flint for redundancy along with sharing the capital cost of the new pipeline by all DWSD customers. How well will other DWSD customers accept this proposition?

8. The DWSD also offers to sell the existing transmission line to Flint for $4.7 million. What are the O&M costs of the transmission main? These costs do not appear to be included in the cost analysis. Will Flint be able to charge (sell) water to the Lapeer county customers that would then be purchasing water from Flint's pipeline? Finally, the pipeline is 50 year old, what is the remaining life expectancy of the pipeline and is this the best long-term investment for Flint? Why is the ~~Engr~~ Average cost of a pipeline repair on owner portion of the main?

9. Page 2 states that the 18 miles of pipeline from KWA to the Flint WTP is a 30-inch diameter main. The KWA Appendix 20 – October 2012 document states the pipeline is a 36-inch diameter main. The city of Flint is also investigating the proper size needed for this pipeline to meet their WTP's rated capacity and will be addressed in the final design.

10. Page 20 states that due to Flint's high water loss that the KWA pipeline will be oversized. KWA pipeline size is being based to meet an ca. 2030 projected water use & needs to be sized for same days of system expansion. MDEQ also doesn't take the position of downsizing sized capacity on the presumption that a utility will fix its internal infrastructure to reduce un-accounted water.

DEPARTMENT OF UTILITIES
Water Plant & Facilities

INTERNAL INSPECTION OF THE 72" TRANSMISSION MAIN MEETING

AGENDA

February 2, 2012
10:00 a.m. to 12:00 p.m.

1. Welcome / Introductions / Agenda Review

2. Monday February 6th

   - Start up of City of Flint's Water Treatment Plant
   - Closing of Genesee Rd. One or Two Lanes?
   - Locate and Saw Cut Road above Man-Way

   - Run all Next week
   - Map on exact location of each sect of pipeline

3. Tuesday February 7th

   - Excavation of Man-Way Completed by Evening
   - 11:00 p.m. Shut Down and Drain 72" Main

   6-8 hrs to drain
   1655 tons of Mud & blow-offs can be opened

4. Wednesday February 8th

   - Morning Pipe Line Drained and Removal of Man-Way Cover
   - 11:00 a.m. Jim Hegarty of Prein & Newhof Enter Pipe for Inspection
   - Afternoon Fill and Chlorinate Pipe Line between Bank and Valve on Meadowbrook
   - 11:00 p.m. put Line back in Service, Direct all Water to Dort Reservoir

5. Thursday February 9th

   - Work with Genesee Co. Road Commission on possible Vault and Manhole Cover for Man-Way and Repairs on Excavation

Develop Repair plan

Flint Water Plant & Facilities 4500 N. Dort Hwy. Flint, MI 48505 Phone: (810) 787-6537 Fax (810) 787-3710

- Enter pipe via mine excavation for cut & less disturbing of pipe.
- Then same when/location of leak & method of repair

other fix from inside or
clean everything up/ dig up & replace — city may not be able to expand

ECCS inputs

- may need to shut valve back to vassar
  then shuts down S. Gen P.T & S-Belsay P.T
- if Belsay rel valve operates — shut down only S. Gen PT

IE

- can enter manway & ~~Core~~ check & Hardwork
- then prepare to enter other manways as rel at Bank
- Possibility of road closures - cue. w. most Con. Trip

expect closure of Parking to be < 24 Hrs, but plan for 36 Hrs → Conc

Repair via "Slip line" — drive in cut off on ends of pipe line repair

72-inch Transmission Main Repair
WTP Operation
City of Flint
2/2/12

1. Communication of events: Official(s) responsible for notification and subsequent updates.

   - MDEQ
   - GCDC & DWSD
   - Customer supplies
   - Media, LHD, Emergency operations
   - Water use reduction measures?
   - WTP operation (avoid BWA)

2. Inspection - Repair to 72-inch transmission main

   - Location, history
   - Contractor
   - Duration, extent, materials used (NSF approved?)
   - Oversight of repair

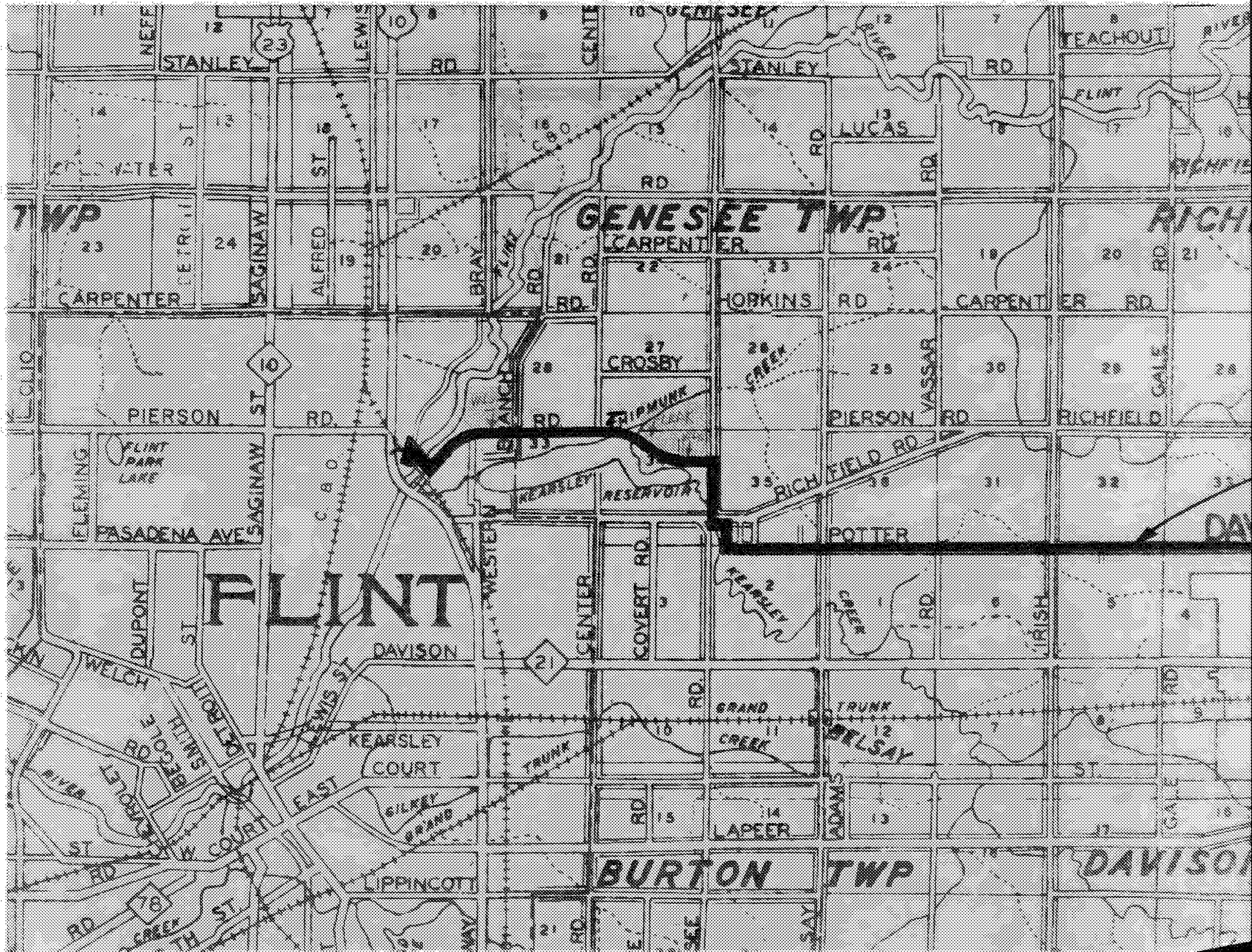
3. WTP Emergency Operation

   - Operational oversight
   - Operating status wrt to status of repair and distribution system status
   - Treatment rate
   - Ozone status
   - WTP turbidities
   - Post chlorination application/residual/demand
   - Intermediate chlorination
   - Bacteriological sampling; WTP plant tap, dist system
   - Distribution system chlorine residuals

4. Pipeline (Flint's portion) simplified schematic or diagram

   - Location of isolation valves, drain and blow-off structures.
   - Locations of previous leaks and completed repairs.
   - Location(s) of any additional leaks
   - Diagram to be updated as needed for use in future repairs

5. 90-day report - Outline of: discovery, cause, duration, correction action, areas affected, public notif, water reduction efforts, etc.


FLINT
GENESEE TWP
BURTON TWP
STANLEY RD
CARPENTER RD
HOPKINS RD
PIERSON RD
PASADENA AVE
DAVISON
KEARSLEY COURT
LIPPINCOTT
POTTER
RICHFIELD RD
SAGINAW ST
DUPONT ST
WELCH BLVD
CENTER RD
LEWIS RD
ALFRED ST
BRAY RD
RANCH RD
VASSAR RD
IRISH RD
ADAMS RD
GALE RD
FLEMING RD
WESTERN RD
KEARSLEY RESERVOIR
FLINT PARK LAKE
CROSBY
LUCAS
LAPEER
TEACHOUT
COVERT RD
GRAND TRUNK W. RR
GRAND TRUNK RR
KEARSLEY CREEK
FLINT RIVER
EAST COURT
WEST COURT
M-15
M-21
M-18

Prysby, Mike (DEQ)

From: Shekter Smith, Liane (DEQ)

Sent: Monday, October 10, 2011 2:27 PM

To: 'jobrien@gcdcwws.com'

Cc: Hoffman, Kelly (DEQ); Prysby, Mike (DEQ); Joseph, Mark (DEQ); Cook, Pat (DEQ); Bloemker, Jon (DEQ); Lee, Lonnie (DEQ)

Subject: Follow-up regarding KWA proposal

John –

I had an opportunity recently to discuss with staff the proposed project to create an Authority to provide raw water to Genesee, Lapeer and Sanilac Counties. Staff indicated that it would be most helpful if you could provide an updated preliminary engineering report, as the document that they last received is dated September 2009. Once we have a chance to see the full scope of the proposed project, then staff will be in a better position to identify responsibilities.

At least initially, we do not envision having a single point of contact for permitting. We will, however, draw very clear lines of responsibility so that you will know who to work with on each portion of the project.

We look forward to working with you.

Liane J. Shekter Smith, P.E., Chief
Resource Management Division
Department of Environmental Quality
517-373-9523

Prysby, Mike (DEQ)

From: John O'Malia <jcomalia@gmail.com>
Sent: Friday, February 01, 2013 9:52 AM
To: David Jansen; Busch, Stephen (DEQ); Prysby, Mike (DEQ); Bloemker, Jon (DEQ); Elgar Brown
Subject: Agenda for 2/8

Gentlemen-I suggest the following agenda:
1-Introductions,
2-Discussion on bidding/bonding the intake project, 3-Present to MDEQ a final set of bid documents with Corps permit. Copy to Steve and Jon and discussion of MDEQ office design review responsibilities, 4-Current status of DWSD latest offer, 5-Current status of Flint City joining KWA, 6-Introduction of design coordination team WT etal, 7-Overview of 2009 KWA report and the current list of committed participants, 8-Timeline to award design engineering contract and entire project timeline for completion, 9-Timeline for bonding project[s], 10-Discussion of preliminary design issues and potential deviation[s] form 2009 report. Timing on final submission of design criteria and final revision of KWA 2009 report, 11-Status on use of raw water in agricultural food processing, 12-Close

Note-Lunch to be ordered in to conserve time. Expect meeting to close around 2ish?

Any questions let me know. See you on the 8th, 10:00AM GCDC offices.

John C. O'Malia, P.E.

Prysby, Mike (DEQ)

From: Benzie, Richard (DEQ)
Sent: Wednesday, January 23, 2013 10:25 AM
To: Prysby, Mike (DEQ); Bloemker, Jon (DEQ); Busch, Stephen (DEQ); Shekter Smith, Liane (DEQ)
Cc: Butler, Sonya (DEQ)
Subject: RE: Flint - Dept of Treasury

Great answers, Mike. The only comments/clarifications I have are in regards to the question on the use of the DWRF to operate the treatment plant full time. The DWRF may be used to construct facilities necessary to make full time operation feasible. However, it should be clear that "operating costs" are not eligible.

Also, any application to the DWRF requires a comprehensive, 20-year project plan, not a one-time, project specific request. The fact that the city of Flint recently turned down a DWRF loan even with a significant portion of it to be "forgiven" that was intended to address high priority distribution system needs cannot be overlooked. The city would have to include these needs in any revised/new project plan and satisfactorily explain any decision to not include these distribution improvements in this new loan application.

From: Prysby, Mike (DEQ)
Sent: Wednesday, January 23, 2013 10:01 AM
To: Bloemker, Jon (DEQ); Busch, Stephen (DEQ); Benzie, Richard (DEQ); Shekter Smith, Liane (DEQ)
Subject: Flint - Dept of Treasury

I spoke with Mr. Randy Byrne from the Dept. Treasury – Office of Fiscal Resp. concerning the Flint WTP. Below is a brief summary of our discussion. I can fill you on more details this afternoon just prior or immediately after our KWA meeting.

Q1: The city of Flint has considered using the Flint River as a source of drinking water to be treated at their WTP; however,
The city may be somewhat reluctant to use the river as their source, what is your assessment of this issue?

A: The city could utilize the Flint River ranging from 100% utilization – to a certain percent blending (either Detroit or KWA) or
zero percent utilization of the river. I agree that the city should have concerns of fully utilizing the Flint River (100%) for the following; the need to soften, the potential for more advanced treatment after next round of crypto monitoring, available capacity in Flint River at 100-year low flow, residuals management (disposal of lime sludge). As the percent utilization of the river decreases (blending options), the need for softening, residuals disposal, capacity issues do not pose as much of a concern.

Q2: When comparing the treatment of Lake Huron water vs. Flint River water, are more treatment chemicals needed to effectively treat the water?

A2: Flint river water will require a larger amount of primary coagulant (Ferric) due to poorer raw water quality than Lake Huron water. Also, a different type of primary coagulant (Alum) may be more suitable for the treatment of Lake Huron water. I can confirm that based on what the Detroit Lake Huron WTP uses. Also, since softening would need to be employed, treatment compounds including lime, soda ash, and carbon dioxide would be necessary.

Q3: If the city needed to borrow money to be able to operate full time (KWA or blending), does the DEQ offer funding via the DWRF?

A3: The city could apply for DWRF funding and their eligibility would be based upon how well they score in the overall DWRF ranking process. Also, the total amount of the loan and their ability to repay the loan would be considered.

Q4: Flint has put forth a significant capital investment over the past 10 years to maintain their WTP, is the condition of the WTP sufficient for full time treatment of raw water from Lake Huron ? Are the operators qualified to operate the WTP?

A4: The Flint WTP has demonstrated its ability to treat raw water (Flint River) and meet the drinking water standards based on quarterly test runs since 2009 and two pipeline emergencies that occurred in 2009 where water from the WTP was distributed to the city. Successful operation of the WTP on an intermittent basis is difficult. WTP operators face the constant challenge of maintaining WTP components in good working order while the plant is normally out of service over 90% of the time. The reliability of WTP and its components are better maintained through continuous operation. The operating experience and knowledge of the operators is also better established with full-time operation. WTP operators have the required operator certification and are very familiar with the operation of the Flint WTP, meeting drinking water standards, and troubleshooting operational problems. The Flint WTP is capable of meeting the drinking water standard if the plant was utilized to treat raw water from Lake Huron.

Q5: Do you see any weak links in the WTP or significant improvements if the WTP were to be fully utilized?

A5: I would not see any major treatment changes or additions needed if Lake Huron water was utilized; however, in order for the city to fully utilize its storage capacity, a pumping station would need to be added immediately after the WTP such that treated water can be pumped into the city's 20-Mgal Dort reservoir. In the current configuration, water from Detroit flows by gravity through this reservoir and then into the WTP's 3 Mgal reservoir followed by pumping via Pump Station No. 4 into the city's distribution system. Improvement in stand-by power may also be necessary. Finally, if a component of Flint River water were to

be treated, then more advanced treatment based upon higher bin classification (UV disinfection, etc.) could be required based upon crypto. results.

Michael Prysby, P.E.
District Engineer
Office of Drinking Water and Municipal Assistance
517 335-6122

Prysby, Mike (DEQ)

From: Bloemker, Jon (DEQ)
Sent: Thursday, May 24, 2012 8:30 AM
To: Ashford, Stephen (DEQ); Prysby, Mike (DEQ)
Subject: Karegnodi Water Authority

On May 23rd, I met with representatives from Rowe Engineering and Lockwood regarding the proposed intake for the Karegnodi Water Authority. Initial plans for the intake line may be submitted to the SBD Office about July 1st. At a later date, plans may be submitted for the low lift pump station and raw water transmission line.

The consultants are proposing a ~85 MGD intake structure with a single 72-inch line going about a mile into Lake Huron. There will be two intakes and Douglas fir timber cribs. The internal velocity of the line and intakes will be less than 0.5 fps. About the only suggestions that I had for the firms was to ensure that any coatings used in the intake line meet ANSI/NSF Standard 60 and the line sending oxidants to the cribs be compatible for chlorine and sodium permanganate.

Following the meeting, I met with James P. Baker, the DNR Fisheries Division's Southern Lake Huron unit. Jim may be proposing some limitations on the work during the months of May (crappie) and November (lake trout).

Lockwood, Andrews & Newnam

September 21, 2011

Mr. Brent Wright, WTP Supervisor
Flint Water Plant
4500 N. Dort Highway
Flint, MI 48505

RE: Analysis of Flint River as a Permanent Water Supply
Appendix 8: Cost of Service Study – Flint Water Treatment Plant

Dear Mr. Wright:

Attached please find a copy of Appendix 8 to the report referenced above. The appendix includes cost information for various WTP improvements related to operating the plant full time based on past reports and our discussions.

If you would like to discuss further, please contact me at 810-333-3201.

Best regards,
LOCKWOOD, ANDREWS AND NEWNAM, INC.

Jeffrey R. Hansen, PE
Project Manager

Enclosures: Appendix 8

Technical Memorandum
Cost of Service Study
Flint Water Treatment Plant

I. Introduction

This Technical Memorandum describes the proposed improvements needed at the Flint Water Plant to treat Flint River water on a continuous basis. The primary foundations for this evaluation were the "Water Treatment Plant Rehabilitation – Phase II" report dated December 2003 and the "Preliminary Engineering Report, Lake Huron Water Supply, Karegnondi Water Authority" dated September 2009. The findings, as presented in the following sections, address the improvements required for the water plant to produce finished water in conformance with the current federal and state drinking water regulations. In addition, operation and maintenance costs for continuous operation have been evaluated and included in order to determine the total cost associated with using the Flint River as a source of water.

Improvements, as proposed in this evaluation, along with those previously made during the Phase I improvements program, will produce a finished water quality equal to the current water quality as received from the DWSD. The design parameters are as follows:

1) Minimum Day Demand – 10-mgd
   Average Day Demand – 15-mgd (14-mgd in 2010 increasing to 15-mgd in 2050)
   Maximum Day Demand – 28-mgd

2) Turbidity – 0.20 NTU

3) Hardness – 80 to 100 mg/l as $CaCO_3$

4) Cryptosporidium – 3-Log Inactivation

5) Giardia – >3-Log Inactivation

6) Viruses – >4-Log Inactivation

7) Taste and Odor – Eliminated with pre-ozonation

8) Trihalomethanes – Less than 80 µg/l

9) HAA5 – Less than 60 µg/l

As part of this investigation, an inspection of the Flint Water Plant was performed on May 3, 2011. The purpose of this inspection was to determine if the recommendations in the Phase II report, as referenced above, needed to be revised due to changed conditions or water supply needs. Based on findings from this meeting, the major adjustment to be made is the reduction of average day demand from 20-mgd to 14-mgd and maximum day demand being reduced from 36-mgd to 28-mgd. Required improvements as recommended in this study have taken these new demands into account. The conceptual design of these new facilities would allow cost effective expansion to 36-mgd, as needed, to meet future demands.

II. Required Capital Improvements

The following describes the required improvements as required for the Flint Water Plant to operate on a continual basis using the Flint River as a water source. Most of these improvements are more fully described in the Phase II report and are not repeated to avoid duplicative effort.

A. Lime Sludge Disposal

Lime sludge is proposed to be pumped from the east and west softening basins to two new 42-ft diameter thickeners (25-ft SWD) located adjacent to the plate settling building. Decant from the thickener will flow by gravity to the primary clarifier influent channel. Thickened sludge (12% solids) will be pumped to a new plate-and-frame filter press located at the north end of the WTP 1 primary settling basin. A new two-story building would be constructed at that location to house the pumping facilities and presses. Each press, located on the second floor, will have a 225-cf per hour capacity and will drop the dewatered sludge into a first floor bunker area. The dewatered cake will be transferred to a lime storage concrete bunker located approximately 60 feet north of the sludge press building. The storage bunker (100-ft x 192-ft) will have the capacity to store three to four months of dewatered lime sludge cake. About every three months, contract haulers will remove the lime sludge and place on agricultural lands that are permitted for final disposal.

The capacities of these facilities are based on average day flow of 15-mgd, maximum day demand of 28-mgd and water quality softening requirements. Based on raw water quality data provided by the City of Flint, a lime dosage of 209 mg/l, soda ash dosage of 47 mg/l and carbon dioxide dosage of 37 mg/l were used to estimate lime sludge quantities and flows.

Opinion of Probable Cost:

Site and Access:			
Site Demolition	$	129,000	
Roadway Improvements	$	385,000	
Partial Settling Basin Demolition	$	129,000	
On-site Truck Scale	$	257,000	
Subtotal Construction:			$ 900,000
Construction Contingencies (15%):			$ 135,000
Design Contingencies (5%):			$ 45,000
Engineering, Legal, Bonds & Administration (17%):			$ 153,000
Opinion of Probable Cost:			**$ 1,233,000**

Thickener Basins - 42 ft Diameter:			
Two Thickener Mechanisms	$	310,000	
Two Concrete Basins (25 ft SWD)	$	513,000	
Two Geodesic Dome Covers	$	180,000	
Install Equipment	$	257,000	
Site Work	$	97,000	
Utilities, Piping and Process	$	193,000	
Subtotal Construction:			$ 1,550,000
Construction Contingencies (15%):			$ 232,500
Design Contingencies (5%):			$ 77,500
Engineering, Legal, Bonds & Administration (17%):			$ 263,500
Opinion of Probable Cost:			**$ 2,124,000**

Filter Presses and Building:

Two-225 cf Plate & Frame Press	$ 1,650,000		
Building (70 ft x 60 ft)	$ 3,331,000		
MEP	$ 1,089,000		
Site Utilities	$ 129,000		
	Subtotal Construction:	$	6,199,000
	Construction Contingencies (15%):	$	929,850
	Design Contingencies (5%):	$	309,950
	Engineering, Legal, Bonds & Administration (17%):	$	1,053,830
	Opinion of Probable Cost:	**$**	**8,493,000**

Lime Storage Bunker and Site Work:

12 ft Concrete Walls and Slab	$ 833,000		
Frame and Fabric Building Cover	$ 325,000		
Site Improvements	$ 385,000		
Front End Loader (5 cyd)	$ 308,000		
Site Utilities	$ 513,000		
	Subtotal Construction:	$	2,364,000
	Construction Contingencies (15%):	$	354,600
	Design Contingencies (5%):	$	118,200
	Engineering, Legal, Bonds & Administration (17%):	$	401,880
	Opinion of Probable Cost:	**$**	**3,239,000**
	Total for Lime Disposal :	**$**	**15,089,000**

B. Soda Ash Feed System

In order to remove the non-carbonate hardness, soda ash will be needed to meet the finished water hardness concentrations. Two new 800 #/hour feeders will be needed to meet the dosage requirements. Each of these feeders will be connected to the existing silos.

Opinion of Probable Cost:

Demolition of Existing Feeders	$ 20,000		
Two 800 #/hr Feeders	$ 112,000		
MEP	$ 109,000		
Chemical	$ 77,000		
New Pneumatic Fill System	$ 58,000		
	Subtotal Construction:	$	376,000
	Construction Contingencies (15%):	$	56,400
	Design Contingencies (5%):	$	18,800
	Engineering, Legal, Bonds & Administration (17%):	$	63,920
	Opinion of Probable Cost:	**$**	**516,000**

C. Additional Chemical Storage

During the Phase I improvements, the MDEQ did not mandate 30-day chemical bulk storage requirements since the plant was a redundant water supply to the DWSD. However, if the facility becomes a continuously operated treatment plant, then additional chemical storage must be added to meet the minimum storage volume requirements. To comply with the regulations, new oxygen, nitrogen and carbon dioxide storage facilities must be provided as follows.

Liquid Carbon Dioxide:
- Capacity – 34 tons
- Vaporizer – 750 #/hour @ 300 psig
- Piping – Schedule 80 Carbon Steel and Schedule 40 - 304L Stainless Steel

Liquid Oxygen
- Capacity – 9000 gallons
- Operating pressure – 75 psi
- Feed Rate – 175 scfm
- Piping – Type K Copper

Liquid Nitrogen
- Capacity – 540 gallons
- Operating pressure – 100 psi
- Feed Rate – 1 scfm
- Piping – Type K Copper

Opinion of Probable Cost:

Carbon Dioxide Storage Facilities	$ 328,000	
MEP	$ 103,000	
Oxygen & Nitrogen Storage Facilities	$ 961,000	
MEP	$ 109,000	
Subtotal Construction:		$ 1,501,000
Construction Contingencies (15%):		$ 225,150
Design Contingencies (5%):		$ 75,050
Engineering, Legal, Bonds & Administration (17%):		$ 255,170
Opinion of Probable Cost:		**$ 2,057,000**

not included 1/1/15

D. Electrical and SCADA Improvements

Section 9, relating to power and controls, of the Phase II study was prepared by Dmytryka Jacobs Engineers (DJE). The scope of the Phase II work did not include detailed investigations of the water plant site-wide power distribution nor the secondary power distribution within each of the facility structures. However, a number of observations and basic recommendations were presented in Section 9 by DJE.

The Flint Water Plant currently uses 2400V as primary power throughout the facility. All of the power feeders in the plant site are 5kV rated and it appears the existing switchgear is also rated at 5kV. Most of the major electrical improvements installed during Phase I were dual voltage (2400/4160) equipment in anticipation of the plant power being changed to 4160V in the near future. This change would allow the existing network of power feeders to handle approximately twice the power and would eliminate running new feeders to various portions of the plant.

The current sub-station has two 2.5MVA transformers running in parallel for a total capacity 5 MVA. These old transformers are not equipped with cooling fans. The full connected load to these transformers is estimated to be 6.97 MVA while the estimated power load at 36 MGD is 4.22MVA. Based on these estimates there is sufficient power for the plant with both sub-station transformers in service. Even though the transformers are owned by Consumers Energy, it could take weeks to replace one of these main transformers in the event of a unit failure, which will result in reduced treatment and pumping capacity. The sub-station switchgear was installed in 1960 and is antiquated and difficult to maintain.

The two existing Fairbanks Morse generators are currently inoperable and would cost approximately $1M to rehabilitate. The DJE team recommended installing two new emergency generators in lieu of re-building the existing units.

Section 9 of the Phase II report provides sufficient detail for the purposes of this report, but a detailed electric system evaluation of the entire plant should be performed prior to any major improvements to this facility.

While LAN did not perform a detailed review of the WTP electrical system during our site visit, it appears that all of the DJE findings are still pertinent. We, therefore, concur with the improvements as recommended by DJE in the Phase I report.

Opinion of Probable Cost:

Substation Upgrade	$ 961,000	
Standby Power Generation	$ 2,242,000	
Pump Station No. 4 Upgrade	$ 1,365,000	
Filter Press Building Feeder	$ 87,000	
WTP SCADA, Equipment & Programming	$ 720,000	
Telemetry System Equipment & Programming	$ 103,000	
Computers, Software & Training	$ 155,000	
Filter Transfer PS Power Feeders	$ 135,000	
Emergency PS Power Feeders	$ 145,000	
Subtotal Construction:	$	5,913,000
Construction Contingencies (15%):	$	886,950
Design Contingencies (5%):	$	295,650
Engineering, Legal, Bonds & Administration (17%):	$	1,005,210
Opinion of Probable Cost:	**$**	**8,101,000**

E. Post-Chlorination and Zebra Mussel Control

The previous report recommended changing the disinfection system from gaseous chlorine to sodium hypochlorite due to the potential for hazardous gas release and the requirements imposed by new federal regulations. Previous treatability studies have not addressed the potential impact of re-growth in the system due to ozonation by-products. These impacts should be addressed prior to proceeding with final plans for using river water.

The Flint River is known to be infested with Zebra mussels and mitigation measures will have to be implemented if the plant is placed into continuous operation. A sodium permanganate feed system is proposed to address these concerns.

Opinion of Probable Cost:

Demolition of Existing Equipment	$	39,000	
Storage Tanks	$	9,000	
Metering Pumps and Tables	$	11,000	
Piping, Valves & Tables	$	9,000	
Containment	$	59,000	
Installation	$	108,000	
	Subtotal Construction:	$	235,000
	Construction Contingencies (15%):	$	35,250
	Design Contingencies (5%):	$	11,750
	Engineering, Legal, Bonds & Administration (17%):	$	39,950
	Opinion of Probable Cost:	**$**	**322,000**

F. Security Issues

For water plant security issues, please refer to City of Flint Vulnerability Assessment. Details are omitted in this report due to confidentiality.

Not available at the time of the previous report, a source water monitoring system is included in the study due to recent advancements in technology. The proposed system design is based on Hach Model SC1000, equipped with UVAS, NH4D, pH, ORP, turbidity and DO probes.

Opinion of Probable Cost:

Security Improvements	$	145,000	
Source Water Monitoring System	$	95,000	
	Subtotal Construction:	$	240,000
	Construction Contingencies (15%):	$	36,000
	Design Contingencies (5%):	$	12,000
	Engineering, Legal, Bonds & Administration (17%):	$	40,800
	Opinion of Probable Cost:	**$**	**329,000**

G. PS No. 4 - Low and High Service Pumps

Section 7 of the Phase II report included recommendations to replace two of the low lift pumps and two of the high lift pumps along with various other improvements. During the site visit, it was apparent the condition of this facility has continued to deteriorate. Furthermore, with the reduction in water system demands, the various pump capacities are no longer properly sized to efficiently meet the new plant flow ranges. The pumps and motors are oversized and are operating outside their best efficiency ranges and should be replaced due to age, condition and cost to operate.

Additionally, some of these pumps cannot be operated due to excessive vibrations in the shaft and steady bearings. Existing vibration monitors are functioning as designed and are shutting the power off to the motors to avoid damage.

For low lift service, it is proposed to install two 10-mgd and two 15-mgd (nominal ratings) vertically mounted pumps equipped with low voltage inverter duty motors. The motors would be powered by low

voltage variable frequency drives. This will provide a firm rated capacity of approximately 35-mgd in low lift capacity.

For high lift service, it is proposed to install one 10-mgd, two 15-mgd and one 20-mgd (nominal ratings) pumps equipped with medium voltage inverter duty motors. These motors will be power by medium voltage variable frequency drives. This combination of pumps will provide a firm rated capacity of 40-mgd.

Opinion of Probable Cost:

Demolition of Existing Equipment	$	135,000	
Install Two (2) 10 MGD @ 40 ft of TDH Vertically Mounted Pumps with 125 HP, 480 V Inverter Duty Motor with 20 ft of Shaft & Steady Bearings	$	473,000	
Install Two (2) 15 MGD @ 40 ft of TDH Vertically Mounted Pumps with 150 HP, 480 V Inverter Duty Motor with 20 ft of Shaft & Steady Bearings	$	495,000	
Install One (1) 10 MGD @ 190 ft of TDH Vertically Mounted Pump with 450 HP, 4160 V Inverter Duty Motor with 20 ft of Shaft & Steady Bearings	$	245,000	
Install Two (2) 15 MGD @ 190 ft of TDH Vertically Mounted Pumps with 700 HP, 4160 V Inverter Duty Motor with 20 ft of Shaft & Steady Bearings	$	520,000	
Install One (1) 20 MGD @ 190 ft of TDH Vertically Mounted Pump with 800 HP, 4160 V Inverter Duty Motor with 20 ft of Shaft & Steady Bearings	$	285,000	
Piping, Valves, Supports & Bearings	$	480,000	
Intermediate Platforms, Ladders & Stairs	$	360,000	
Ventilation & Boiler Systems	$	340,000	
Install Three (3) Low Voltage VFD Units	$	85,000	
Install Four (4) Medium Voltage VFD Units	$	2,250,000	
Subtotal Construction:	$		5,668,000
Construction Contingencies (15%):	$		850,200
Design Contingencies (5%):	$		283,400
Engineering, Legal, Bonds & Administration (17%):	$		963,560
Opinion of Probable Cost:	**$**		**7,766,000**

H. Filter Transfer Station to Dort Reservoir and UV Inactivation

Under the requirements as outlined in the USEPA drinking water regulations addressing potential microbial contaminants, additional treatment technologies and enhancement of existing processes must be implemented to comply with these regulations.

As required under the enhanced surface water treatment rules, it is essential for water utilities to address giardia, cryptosporidium, viruses and bacteria in finished water. The level of treatment is dependent on

the source water classification. The City of Flint will need to perform a two-year source water study to determine the bin placement for the Flint River. For the purposes of this report, a Bin 4 placement was selected due to the nature of the watershed and, therefore, it is assumed enhanced Ct and UV inactivation will be required.

Reservoir No. 3 does not provide sufficient Ct to meet the current regulations, therefore, Dort Reservoir will need to be placed into the process train. Since Dort Reservoir does not match the hydraulic profile of the plant, an intermediate pump station will be required. This new facility will also include a UV inactivation system to comply with the enhanced water quality regulations.

This proposed facility, located west of the filters and south of Dort Reservoir, will house three 14-mgd (nominal rating) variable speed pumps with inverter duty, low voltage motors for a firm rated capacity of 28-mgd. Housed in a separate part of this same structure will be the UV system that will be equipped with three 12" medium pressure units with a rated capacity of 28-mgd.

Opinion of Probable Cost:

Site Work & Utilities	$ 77,000	
Building (80 ft x 60 ft)	$ 1,440,000	
Three (3) 14 MGD @ 40 ft of TDH, Vertically Mounted Pumps with 150 HP, 480 V Inverter Duty Motor	$ 535,000	
MEP	$ 940,000	
Valves and Controls	$ 205,000	
Install Three (3) 12" MP UV Units	$ 590,000	
UV Piping & Controls	$ 368,000	
Ventilation & Boiler Systems	$ 165,000	
Install Three (3) Low Voltage VFD Units	$ 85,000	
Piping Connections	$ 125,000	
200 ft of 30" Water Main	$ 200,000	
600 ft of 36" Water Main	$ 420,000	
Subtotal Construction:		$ 5,150,000
Construction Contingencies (15%):		$ 772,500
Design Contingencies (5%):		$ 257,500
Engineering, Legal, Bonds & Administration (17%):		$ 875,500
Opinion of Probable Cost:		**$ 7,056,000**

I. Emergency Interconnect Pumping Station

The City of Flint and Genesee County DWWS have entered into an agreement to provide 8-mgd of back-up service to each other under emergency conditions. There are several alternatives for pumping station locations and configurations to accomplish this interconnect. For the purposes of this report, a station located west of the filter building was selected as the most practical from and operational cost perspective. While the opinions of cost presented below indicate that these pumps will be housed in their own structure, it is feasible to house the pumps in the filter transfer station for potential savings.

Preliminary design for this pumping station include two constant speed 8-mgd pumps equipped with soft starts and medium voltage motors. A reverse flow control station will be included within the same structure to allow for flow from the DWWS to assist the City of Flint. Approximately three miles of 24-inch pipeline will be needed to connect the two systems.
Opinion of Probable Cost:

Site Work & Utilities	$ 90,000	
Building (32 ft x 24 ft)	$ 245,000	
Install Two (2) 8 MGD @ 290 ft of TDH, Vertically Mounted Pumps with 600 HP, 4160V Motor	$ 380,000	
MEP	$ 335,000	
Valves and Controls	$ 128,000	
Reverse Flow Control Station	$ 110,000	
Ventilation Systems	$ 35,000	
16000 ft of 24" Water Main	$ 4,992,000	
Subtotal Construction:		$ 6,315,000
Construction Contingencies (15%):		$ 947,250
Design Contingencies (5%):		$ 315,750
Engineering, Legal, Bonds & Administration (17%):		$ 1,073,550
Opinion of Probable Cost:		**$ 8,652,000**

The opinions of capital cost presented in the preceding sections are tied to an ENR Index of 8688 to match the September 2009 Lake Huron Water Supply Report. Furthermore, the contingency percentages included with each opinion of cost are the same as in the September 2009 report. The total opinion of probable project cost of these proposed improvements is as follows:

Lime Sludge Disposal		$ 15,089,000
Soda Ash Feed System		$ 516,000
Additional Chemical Storage		$ 2,057,000
Electrical and SCADA Improvements		$ ~~8,101,000~~
Post-Chlorination and Zebra Mussel Control		$ 322,000
Security Issues		$ 329,000
PS No. 4 - Low & High Service Pumps		$ 7,766,000
Filter Transfer Pumping Station & UV		$ 7,056,000
Emergency Interconnect Pumping Station		$ 8,652,000
Total Opinion of Probable Project Cost:		**$ 49,888,000**

III. Cost of Additional Operation

The City of Flint currently operates the water treatment plant periodically during the year to maintain the systems and to meet regulatory requirements. The water treatment plant is staffed with various classifications of employees to operate and maintain the facility for these minimal operations.

As part of this work, and to develop all costs of providing water service from the Flint River, it is necessary to determine the probable cost for operating and maintaining this facility for continuous operation. Water quality differences between the Flint River and Lake Huron are significant and require different treatment chemicals and dosages. Most noticeable is the fact that Lake Huron water does not require softening which negates the need for softening process and the associated lime sludge disposal.

The primary cost parameters that are included in this difference are labor, chemicals, residual disposal and electrical power. Each will be discussed in the following sections. These costs were projected through the year 2050.

A. Labor

Additional staffing was discussed and developed with representatives from the City of Flint to provide full time coverage on a 24/7/365 schedule, plus provide staff for residual management and operations of the various dams. Hourly rates and fringe benefits were based on current budget figures and inflated at a rate of 3% for future costs. The following table outlines the proposed staffing a cost for this operational element.

Classification	Number	Cost/Hr	Hrs/Year	Total	Fringe (%)	Total
Operators	12	$ 20.00	2080	$ 499,200	90.40%	$ 950,477
Maintenance	4	$ 25.00	2080	$ 208,000	90.40%	$ 396,032
Laboratory QA/QC	2	$ 24.00	2080	$ 99,840	90.40%	$ 190,095
Laboratory SDWA	2	$ 20.00	2080	$ 83,200	90.40%	$ 158,413
Planned Overtime	NA	MIXED	8320	$ 178,048	90.40%	$ 339,003

This estimate represents approximately $2,034,000 per year of additional labor.

B. Chemicals

Chemical costs are based on the projected average day water demand of 14-mgd and the average dose for each of the chemicals based on the raw water quality information and other operational records. Further, data from the previous treatability work performed during the Phase I improvements was also incorporated into these estimates. Chemical suppliers and other water utilities were contacted to obtain current chemical purchase costs which were adjusted by the ENR ratio back to an index of 8688. Where necessary, transportation costs to the Flint, MI area were included. The following summarizes the chemical costs associated with treating the Flint River water.

Chemical	Dose(mg/l)	Cost/#	Cost/ MGD
Ferric	44.50	$0.24	$89.07
Lime	209.00	$0.10	$174.31
Soda Ash	47.00	$0.29	$113.67
CO_2	37.00	$0.10	$30.86
Cl_2	3.00	$0.34	$8.51
Fluoride	1.00	$0.33	$2.75
Phosphate*	1.00	$0.51	$4.25
		Cost per MGD	$423.42

*Costs range from $0.51 to $0.96 per pound

In addition to the above, the cost of ozone will need to be added which is approximately $20.08 per million gallons per day per mg/l dose. This cost includes oxygen, nitrogen and power costs.

C. Residual Disposal

This category is divided into two groups: clarifier sludge collected in the plate settling basins and lime sludge from the softening process. The clarifier sludge is pumped from the clarifier basins by zone (six zones per train, three trains, total of 18 zones) to the plant main drain. As part of the Phase I work, the main drain was connected to a new wastewater pumping station located south of the filter gallery building. This pump station discharges the collected residuals to the city's sanitary sewer system. Nearly all of the filter wash water is recirculated back to the head of the ozone facility for re-use.

The cost to treat clarified sludge discharged into the sanitary sewer system is calculated as follows:

Plate Clarifier Sludge	
Flow (MGD)	14
SS (mg/l)	75
Primary Sludge (#/d	13,435
% Solids	2%
Sludge (gals/day)	80,500
Sludge (cf/day)	10,762

Based on the City of Flint's current wastewater charges of $1.00 per 100 cf, the annual cost would be $39,200 per year.

Lime/Soda Ash softening generates large quantities of residual wastes that have high disposal costs. The treatment proposed in this study involves pumping the sludge, at about 4% concentration, from the softening basins to two gravity thickeners, where it will concentrate to about 12% solids. After thickening, sludge will be pumped to the filter presses to be dewatered to approximately 55% solids. The filter presses will drop the cake into a lower bunker where it will be removed by an end loader to the main storage bunker. About every three months, the sludge will be loaded onto trucks and applied to agricultural land.

The volume of sludge is estimated as follows:

Sludge Production from Clarifier

Reaction	meq/l	meq/l as $CaCO_3$	meq/l as $Mg(OH)_2$
CO_2	0.25	0.25	0
$Ca(HCO_3)_2$	4.65	9.30	0
$Mg(HCO_3)_2$	0.30	0.60	0.30
$MgSO_4$	0.89	0.89	0.89
Excess Lime	1.25	1.25	0
Total meq/l		12.28	1.19
Less Practical Limits meq/l		0.60	0.20
Precipitate Produced meq/l		11.68	0.99
Precipitate Produced mg/l		584	49
Precipitate Produced #/MG		4872	412
Total #/MG		5284	

WTP Flow (MGD)	14	27		
Dry Sludge Production in #/day	73,983	142,681		
@ 4% Solids (gals/day)	221,771	427,701		
@ 12% Solids (gals/day)	73,924	142,567		
@ 12% Solids (gals/week)	517,466	997,970		
Dry Sludge Production (tons/week)	259		SG $CaCO_3$	2.71
Number of Hours per Week to Press	48		SG $Mg(OH)_2$	2.36
Dry Sludge Processed (#/hr)	10,789		SG solids	2.68
@ 55% Solids Sludge Processed (#/hr)	19,617			
55% Solids Sludge (#/cy)	2571		Sludge Solids =	55% as $CaCO_3$
@ 55% Solids Sludge Processed (cf/hr)	206		Sludge Unit Wt. =	95.22 pcf

Based on the preceding, 471 tons of softening sludge at 55% solids will be handled each week based on average flow and chemical dosage. Several Michigan water facilities were contacted to obtain lime sludge hauling and disposal costs. From this data a rate of $18.50 per wet ton was selected as a reasonable rate for disposal cost. This rate will result in an annual cost of $453,000.

D. Power

Practically all of the additional power costs are associated with low lift, intermediate transfer and high service pumping. Additional power costs will be used for process and handling of the softening sludge. The City of Flint is currently paying $0.07 per kwhr for service at the water plant. Power costs are calculated as follows:

TDH (ft) - High	190
TDH (ft) - Filter Transfer	40
TDH (ft) - Low	40
TDH Total (ft)	270
Pump Eff. (W to W)	80.00%
$/kwhr	$0.070
Pumping Cost Per MGD	$99.51
Solids Handling per MGD	$4.98
Total Power Cost per MGD	$104.49

Annual costs associated with the operation and maintenance of the Flint Water Plant are summarized in the attached tables following this section.

IV. Project Implementation Schedule

There are a number of issues that will impact the implementation schedule for this work. The source water studies to define bin number associated with cryptosporidium and giardia will take approximately two years. Part of these studies can be performed concurrently with design, but sufficient work will need to be performed to avoid impacting design schedule or work. A planning period of one year should be allowed for preliminary water quality and regulatory evaluations prior to initiating design work. Design of this project will require 10 to 12 months, with an additional three months required for permitting. After permits are received, allow three months for bidding and contract execution. Major equipment procurement and construction will take from 24 to 30 months. Plant commissioning will take about 2 months.

Total time required from notice to proceed to project completion 52 months to 60 months. This time frame does not include financing issues.

2011 Drinking Water Infrastructure Needs Survey And Assessment

U.S. Environmental Protection Agency
Washington, DC 20460

OMB No.: 2040-0274
Approval Expires: 02/28/2014
Federal PWSID No.: _____

Please verify or correct the following information:

	Check if Correct as Printed	Corrected Information (Fill in only if the printed information is missing or incorrect)
Name of System (Community): FLINT, CITY OF	☐	
Name of Contact: WRIGHT, BRENT Street Address: 4500 N. DORT HIGHWAY, FLINT WATER PLANT City, State, and Zip: FLINT, MI 48505	☐	
Population Served (if wholesale seller, include population of systems sold to): 272690	☑	102000
Number of Connections (not including those in consecutive systems):48200	☑	35132
Total System Design Capacity: _____ MGD		
Source Water Type (Ground, Surface/GWUDI, etc.):	Check All That Apply: ☐ Ground ☑ Surface/GWUDI ☐ Purchased Ground ☑ Purchased Surface/GWUDI	
Ownership Type: PUBLIC	Check All That Apply: ☑ Public ☐ Federal Government ☐ Native American ☐ Investor-Owned or Private Non-Profit	

Public reporting burden for this collection of information is estimated to average 7.51 hours per response. This estimate includes time for reviewing the instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collected. Burden means the total time, effort, or financial resources expended by person(s) to generate, maintain, retain, or disclose or provide information to or for a Federal Agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information; adjust the existing ways to comply with any previously applicable instructions; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR Part 9 and 48 CFR Chapter 15.

Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, OPPI, Regulatory Information Division, U.S. Environmental Protection Agency (1804A), Ariel Rios Building, 1200 Pennsylvania Ave., NW, Washington, DC 20460; and Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th Street, N.W., Washington, DC 20503.

State Use Only
State Reviewer: _____ Telephone Number: _____

Information provided for this survey can be requested by the public. It is our experience that this information is rarely requested.

wm. Repl: → Webster Rd
Since 2011 → MLK / Market

Source, Treatment, Storage, and Pumping Inventory

To ensure all potential source, treatment, and storage projects are considered, it may be helpful to complete some or all of this inventory table. However, completion of this table is not required.

- **Source Projects** are all projects related to collecting and pumping raw water. This includes wells, surface water intakes, springs, off-stream raw water storage, pumps, and well houses.
- **Treatment Projects** are all projects related to disinfection, filtration, or other treatment processes for ground or surface water sources, or for treatment applied in the distribution system.
- **Storage and Pumping Projects** are related to finished or treated water storage, and booster pump stations.

Inventory	Needing Replacement	Needing Rehabilitation	New Infrastructure Needs
Total Number and Capacity of Existing Wells or Springs:	Wells (pumps included) or Springs:	Wells (pumps included) or Springs:	Does your system have additional source water capacity needs to meet the needs of current users? ☐ Yes ☐ No If yes, how many additional sources are necessary?
Total Number and Capacity of Existing Surface Water Sources:	Existing Surface Water Intakes (excluding pumps):	Existing Surface Water Intakes (excluding pumps):	
Total Number and Capacity of Existing Pumps (excluding booster pump stations):	Existing Groundwater Pumps (if wells not listed):	Existing Groundwater Pumps (if wells not listed):	
	Existing Raw Surface Water Pumps:	Existing Raw Surface Water Pumps:	

Inventory	Needing Replacement	Needing Expansion/Upgrading or Rehabilitation	New Infrastructure Needs
For the sources identified above, enter the number of locations where the following treatment is applied:			
Disinfection (including booster disinfection):	Disinfection:	Disinfection:	Does your system have additional treatment needs for provisions of additional public health protection or for aesthetic concerns? ☐ Yes ☐ No If yes, how much additional treatment is necessary?
Filtration:	Filtration:	Filtration:	
Chemical removal or addition:	Chemical treatment:	Chemical treatment:	

Inventory	Needing Replacement	Needing Rehabilitation	New Infrastructure Needs
Total Number and Capacity of Existing Storage Tanks:	Number of Existing Elevated or Ground- Level Storage Tanks:	Number of Existing Elevated or Ground-Level Storage Tanks:	Does your system have additional storage capacity and/or booster pumping needs to meet the needs of current users? ☐ Yes ☐ No If yes, how much additional finished water storage or booster pumping capacity is necessary?
Total Number and Capacity of Existing Booster Pump Stations:	Number of Existing Booster Pump Stations:	Number of Existing Booster Pump Stations:	

Transmission and Distribution Inventory

Transmission and distribution projects are the piping needs of a water system. Projects for **valves, backflow prevention devices and assemblies, hydrants, and meters** that are not part of a transmission or distribution project listed in this table should be recorded in the table under the tab titled "Inventory Table 3".

On the table below, please provide an estimate of the total feet or miles of pipe in your system, if possible. Completion of this table is not required, but it may be helpful to ensure all potential transmission and distribution pipe projects are considered.

Note: The total feet or miles or pipe in your system is required information if any pipe projects are submitted based solely on survey-generated documentation (documentation codes 10 or 11).

☐ feet ☐ miles **Total Pipe in System** *(Check feet or miles)*

Total Pipe in System (Check feet or miles)		<=6 inch	8-12 inch	15-42 inch	>=48 inch
Plastic	☐ feet ☐ miles	Amount of PVC by pipe size ☐ feet ☐ miles	☐ feet ☐ miles	☐ feet ☐ miles	☐ feet ☐ miles
	% of total pipe	% of this category/size pipe currently in poor condition or beyond useful life %	%	%	%
Ductile Iron	☐ feet ☐ miles	Amount of ductile iron by pipe size ☐ feet ☐ miles	☐ feet ☐ miles	☐ feet ☐ miles	☐ feet ☐ miles
	% of total pipe	% of this category/size pipe currently in poor condition or beyond useful life %	%	%	%
Cast iron	☐ feet ☐ miles	Amount of cast iron by pipe size ☐ feet ☐ miles	☐ feet ☐ miles	☐ feet ☐ miles	☐ feet ☐ miles
	% of total pipe	% of this category/size pipe currently in poor condition or beyond useful life %	%	%	%
Asbestos Cement	☐ feet ☐ miles	Amount of asbestos cement by pipe size ☐ feet ☐ miles	☐ feet ☐ miles	☐ feet ☐ miles	☐ feet ☐ miles
	% of total pipe	% of this category/size pipe currently in poor condition or beyond useful life %	%	%	%
Other	☐ feet ☐ miles	Amount of other by pipe size ☐ feet ☐ miles	☐ feet ☐ miles	☐ feet ☐ miles	☐ feet ☐ miles
	% of total pipe	% of other currently in poor condition or beyond useful life %	%	%	%

Meters, Service Lines, Backflow Prevention Devices/Assemblies, Hydrants, Valves, etc.

Projects for meters, service lines, backflow prevention devices and assemblies, valves, hydrants and other miscellaneous projects are recorded in this section to accommodate entries of multiple identical items on one line in the project table.

Record only projects that are not a part of another project (e.g., water main replacement projects will already include valves, hydrants and other appurtenances). EPA requires documentation of all projects provided. Applicable types of documentation are presented in List 4 of the Lists of Codes. Use only existing documentation of cost. We do not expect you to develop new cost estimates.

To ensure all potential projects are considered, it may be helpful to complete some or all of this inventory table. However, completion of this table is not required.

Inventory	Needing Replacement	New Infrastructure Needs
Total Number of Existing Water Meters:	Number of Water Meters:	Number of Water Meters:
Total Number of Existing Backflow Prevention Devices/Assemblies:	Number of Backflow Prevention Devices/Assemblies:	Number of Backflow Prevention Devices/Assemblies:
Total Number of Valves:	Number of Valves:	Number of Valves:
Total Number of Existing Hydrants:	Number of Hydrants:	Number of Hydrants:
Total Number of Lead Service Lines:		

Climate Readiness
Supplemental Questions

If you used code 2G from List 3, in the "Regulation or Secondary Purpose" column of the survey, indicating that you have one or more projects that are related to climate readiness, please answer the following questions. Only one response is requested; do not provide a response for each project.

Projects that included a climate ready component [Project #(s)]: _____

Which of the following secondary consequences of climate change have contributed to your system's need for climate readiness projects? (check all that apply)

- ☐ Source water quality (e.g., water quality degradation affecting treatment processes, alternate sources)
- ☐ Source water quantity (e.g., availability affected by snowmelt or weather patterns, or hydraulic patterns)
- ☐ Infrastructure Vulnerability (e.g., facility locations affected by sea level rise, increased precipitation intensity)
- ☐ Other (please explain) _____

Please describe the data you are relying on to determine climate change consequences and implications.

- ☐ Model developed from state-specific data.
- ☐ Model developed from region-specific data.
- ☐ Other (please describe) _____

Respondent Information

Please provide the following information in case we need to contact you for clarification or additional explanation of any of your responses.

Contact Person (Person who completed this questionnaire):

Signature:		Telephone Number:	(810) 787-6537
Name (please print):	BRENT F. WRIGHT	Fax Number:	(810) 787-3710
Title:	WATER PLANT SUPERVISOR	E-mail Address:	bwright@cityofflint.com
Mailing Address:	CITY OF FLINT WATER PLANT	Best Time to Reach You:	M-F 7-4
(Street Address)	4500 N. DORT HWY		
	FLINT, MI 48505		

If you have any questions, contact your state coordinator or call the U.S. EPA toll-free Needs Survey Helpline at 1-877-367-9030.

CLOSING: Thank you for your help. Did you remember to?

- ☐ Attach all additional project tables to the questionnaire?
- ☐ Identify, by project number, available documentation for all needs and costs reported above?
- ☐ Put the questionnaire and the documentation in the pre-paid, pre-addressed Federal Express Pak provided and return this questionnaire and the documentation to the address below? (See the pink enclosure for further return instructions.)

Project Table

OMB No.: 2040-0274

Approval Expires: 02/28/2014

MI0002310

Using the completed inventory, capital improvement plans, or other existing planning documents and resources, please identify and document projects on the table below.

Source, Treatment, Storage, and Pumping Project numbers should start with Project #1000.

Transmission and Distribution Project numbers should start with Project #2000.

Backflow Prevention Devices/Assemblies, Hydrants, Service Lines, Valves, Water Meter, and Other Project numbers should start with Project #3000.

If a project is coded 2G for "climate readiness" from List 3, please refer to tab 6 of this workbook for supplemental questions.

Please do not include units. Refer to the header to determine the valid entry for the cell.

*If you have any problems, please call the DWINSA helpline at: **1-888-357-9030***

Project Number (Enter a unique 4 digit number)	Project Name (Provide short description of the project)	Type of Need (Enter code(s) from List 1)	Purpose of Need (Enter code(s) from List 2)	New, Expand, Upgrade, Replacement, Rehabilitate (Enter one code (NEERU) from List 4)	Current or Future (Enter one code)	List 3	Design Capacity (Enter capacity in MGD or kW if applicable)	Diameter or Size (Enter diameter in inches if applicable)	Length of Pipe (Enter length of pipe in feet if applicable)	Number Needed (Enter number needed if applicable)	Cost Estimate (Provide cost estimate if available)	Date of Cost Estimate (Use MM/YYYY format)	Documentation (Enter code(s) from List 5)
1000	Treatment Plant Process SCADA	w2	A1	E	F	4A	28 ~~30~~				720,000 ~~420,000~~	9/11 ~~12/2003~~	2 ~~2,20~~
1001	WTP EKP- Replace 2 h.s. pump & VFD	T10 ~~P1~~	A1	E ~~R~~	F	4A ~~2B~~	28 ~~15~~			2	40,310,000 520,000	9/11 ~~6/2011~~	2 ~~2~~
1002	~~Replace 1 h.s. pump &~~ VFD	P1	A1	R	F	2B	10			1	245,000	6/2011	2
1003	~~Replace 1 h.s. pump &~~ VFD	P1	A1	R	F	2B	20			1	285,000	6/2011	2
1004	~~Replace 2 l. s. pump~~ & VFD	P2	A1	R	F	2B	10			2	473,000	6/2011	2
1005	~~Replace 2 l. s. pump~~ & VFD	P2	A1	R	F	2B	15			2	495,000	6/2011	2
1006	~~Plant to Dort Reservoir~~ Pump Station	P1	A11	N	F	4A					7,756,000	6/2011	2
1002 ~~1007~~	PS3 PUMP #1 REPLACE	P1	A1, A4	R	F	4A	8			1			20 ~~1,11~~

Project Number (Enter a unique project number)	Project Name (Provide short description of the project)	Type of Need (enter code(s) from list)	Reason for Need (enter code(s) from list)	New, Expand, Upgrade, Replace, or Rehabilitate (enter one code from list)	Current or Future (Enter one code)		Design Capacity (Enter capacity in MG, MGD or Watt, as applicable)	Diameter or Size (Enter diameter in inches, as applicable)	Length of Pipe (Enter length of pipe in feet, as applicable)	Number Needed (Enter number needed, if applicable)	Cost Estimate (Provide cost estimate, if available)	Date of Cost Estimate (in mm/yyyy format)	Document Section (Enter code(s) from list)
1003 ~~1008~~	PS3 PUMP #2 REPLACE	P1	A1, A4	R	F	4A	12 MGD			1			20 ~~11~~
1004 ~~1009~~	PS3 PUMP #3 REPLACE	P1	A1, A4	R	F	4A	16 MGD			1			20 ~~4, 11~~
1005 ~~1010~~	PS3 STAND-BY POWER	W4	A11	N	F	4A	20 KW			1			20 ~~4, 11~~
1006 ~~1011~~	PS6 STAND-BY POWER	W4	A11	N	F	4A	20 KW			1			20 ~~11~~
~~1012~~	~~WTP~~	T10	A1	H	F	4A	36			1			11
1007 ~~1013~~	REPLACE SWITCHGEAR @ PS3	P2	A1	R	C	2B				1	812,000	4/2009 7/2011	2 ~~3, 10~~
1008 ~~1014~~	REHAB TORREY RD BOOSTER STA.	P2	A1	H	C	4A				1	241,000	4/09 7/2011	2 ~~4~~, 11
1009 ~~1015~~	CEDAR ST. RESERVOIR REHAB	S2	A1	H	F	4A	20 MG			1			20 ~~1~~
1010 ~~1016~~	WEST-SIDE RESERVOIR REHAB	S2	A1	H	F	4A	12 MG			1			20 ~~1~~
1011 ~~1017~~	PUMP STATION 5 RE-HAB	P2	A1	H	F	4A	24 MG			1			20 ~~1~~
~~1018~~	~~PUMP STATION 6 RE-HAB~~	P2	A1	H	F	4A	36			1			1

Total Pipelength → 2.93 million Feet 10% 292,800 LF
Projects 2000 & 2001 replacement 3.89%, ∴ 6.16% Left from replacement

Project Number (Unique 4 digit number)	Project Name (Provide short descriptive name for project)	Type of Need (Enter code(s) from list 1)	Basis for Need (Enter code(s) from list 2)	New, Expand, Upgrade, Replace, or Rehabilitate (Enter N, E, U, R, or RH)	Current or Future (Enter one code)		Design Capacity (Enter capacity in MGD, MGD/in, AF, or applicable)	Diameter or Size (Enter diameter in inches, if applicable)	Length of Pipe (Enter length in feet, if applicable)	Number Needed (Enter number needed, if applicable)	Cost Estimate (Enter total cost estimate, if available)	Date of Cost Estimate (In mm/yyyy format)	Document Basis (Enter code(s) from list 3)	
2000	UPGRADE 3" & 4" MAINS WITH 8"	M1	A1	R ~~N~~	C	4A		8.000	102600		12,000,000 ~~10,260,000~~	2/2007	20 ~~1~~	
2001	REPLACE CRITICAL 6" MAINS WITH 8"	M1	A1	R ~~N~~	C	4A		8.000	10000		1,000,000 ~~10,000,000~~	2/2007	20 ~~1~~	
2002	LOOP EXSISTING 6" MAINS WITH 8"	M1	A1	N	C	4A		8.000	3,025' ~~2680~~		470,000 ~~360,000~~	4/09 ~~2/2007~~	~~1,2~~	
2003	LOOP EXSISTING 12" MAINS	M1	A1	N	C	4A		12.000	800		185,000 ~~100,000~~	4/09 ~~2/2007~~	1,2	
2004	REPLACE EXISTING 8" MAIONS WITH 8"	M1	A1	N	C	4A		8.000	91,000' ~~140000~~		NA ~~140,000,000~~	~~2/2007~~	20 ~~1~~	6%
2005	REPLACE 8" MAINS	M1	A1	N	C	4A		8.000	45,500' ~~70000~~		NA ~~70,000,000~~	~~2/2007~~	20 ~~1~~	6.8%
2006	REPLACE 10" & 12" MAINS WITH 12"	M1	A1	N	F	4A		12.000	15,600' ~~24000~~		NA	NA	20 ~~1~~	6.1%
2007	REPLACE 14" AND 16" MAINS WITH 16"	M1	A1	N	F	4A		16.000	10,400' ~~16000~~		NA	NA	20 ~~1~~	6.6%
2008	REPLACE 18" MAINS	M1	A1	N	F	4A		18.000	19,800' ~~24000~~	4160	7,700,000	10/2011	1,2	31.5%
2009	REPLACE 24" MAINS	X2	A1	N	C	4A		24.000	53,500' ~~120000~~	500	17,500,000	10/2011	1,2	46.1%
2010	REPLACE 30" MAINS	X2	A1	N	C	4A		30.000	5,800' ~~18000~~	1040	2,600,000	10/2011	1,2	35.9%

6 & 4" MAINS → 10% 11,600 LF
6.16% → 7,145 LF & 7940 LF

Project Number (Enter a unique 4-digit number)	Project Name (Provide short description of the project)	Type of Need (Enter code(s) from List 1)	Reason for Need (Enter code(s) from List 2)	N, E, U, R, or H (Enter one: N = New, E = Expand, U = Upgrade, R = Replace, H = Rehabilitate)	Current or Future (Enter one: C = Current, F = Future)		Design Capacity (Enter capacity in MG/MGD or other applicable unit)	Diameter or Size (Enter diameter in inches or other applicable unit)	Length of Pipe (Enter length in appropriate unit, i.e., feet, miles, or other applicable unit)	Number Needed (Enter number needed, if applicable)	Cost Estimate (Provide cost estimate, if available)	Date of Cost Estimate (in mm/yyyy format)	Document-ation (Enter code(s) from List 3)
2011	REPLACE 36" MAINS	X2	A1	R	C	4A		36.000	715 ~~11000~~		NA	NA	20
2012	LOOP EXSISTING 8" MAINS	M1	A1	N	C	4A		8.000	400 ~~100000~~		65,000 ~~10,000,000~~	4/09 ~~2/2007~~	1, 2
2013	REPLACE 42" MAINS	X2	A1	R	F	4A		42.000	95 ~~1840~~		NA	NA	20
2014	REPLACE 72" MAINS	X2	A1	R	C	4A		72.000	3744 ~~57600~~		NA	NA	20
3000	REPLACE RESIDENTIAL METERS	M8	A1	R	C	4A		0.625		32931			20
3001	REPLACE RESIDENTIAL METERS	M8	A1	R	C	4A		1.000		471			20
3002	REPLACE RESIDENTIAL METERS	M8	A1	R	C	4A		1.500		393			20
3003	REPLACE RESIDENTIAL METERS	M8	A1	R	C	4A		2.000		20			20
3004	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		0.625		439			20
3005	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		1.000		281			20
3006	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		1.500		350			20

Project Number (Enter project number)	Project Name (Provide short description of the project)	Type of Need (Enter code(s) from list)	Reason for Need (Enter code(s) from list)	Lead, Present, Upsize, Replace or One (If applicable) (Enter one code)	Current or Future (Enter one code)		Design Capacity (Enter capacity in MGD or GPM (If applicable))	Diameter or Size (Enter diameter in inches (If applicable))	Length of Pipe (Enter length of pipe in feet (If applicable))	Number Needed (Enter number needed (If applicable))	Cost Estimate (Provide cost estimate (If available))	Date of Cost Estimate (Enter date in MM/YYYY format)	Position in List (Enter code(s) from list)
3007	REPLACE COMMERCIAL METERS	M8	A1	R N	F	4A		2.000		368			20 1
3008	REPLACE COMMERCIAL METERS	M8	A1	R N	F	4A		3.000		107			20 1
3009	REPLACE COMMERCIAL METERS	M8	A1	R N	F	4A		4.000		71			20 1
3010	REPLACE COMMERCIAL METERS	M8	A1	R N	F	4A		6.000		47			20 1
3011	REPLACE COMMERCIAL METERS	M8	A1	R N	F	4A		8.000		3			20 1
3012	REPLACE COMMERCIAL METERS	M8	A1	R N	F	4A		10.000		6			20 1
3013	REPLACE COMMERCIAL METERS	M8	A1	R N	F	4A		16.000		1			20 1
3014	REPLACE COMMERCIAL METERS	M8	A1	R N	F	4A		24.000		1			20 1
3015	REPLACE OTHER COMMERCIAL METERS	M8	A1	N	F	4A				30			1
3015 ~~3016~~	LEAD SERVICE REPLACEMENT	M2	A1	R N	C	4A		1.000		18000			1
3017	OTHER SERVICE LINE REPLACEMENT	M2	A1	R N	F	4A		1.000		15000			1

Project Number (Enter a unique 4 digit number)	Project Name (Provide short description of the project)	Type of Need (Enter code(s) from List 1)	Reason for Need (Enter code(s) from List 2)	New, Expand, Upgrade, Replace or Rehabilitate (Enter one: N, E, U, R or H)	Current or Future (Enter one: C or F)		Design Capacity (Enter capacity in MG (MGD) or MW (if applicable))	Diameter or Size (Enter diameter in inches (if applicable))	Length of Pipe (Enter length in appropriate feet (if applicable))	Number Needed (Enter number needed (if applicable))	Cost Estimate (Enter cost estimate (if available))	Date of Cost Estimate (Enter date in mm/yyyy format)	Documentation (Enter one or more from List 3)
3018	REPLACE SERVICE LINES > 1"	M2	A1	N	F	A4				2978			1

Prysby, Mike (DEQ)

From: Fisher, Brant (DEQ)

Sent: Thursday, March 15, 2012 2:38 PM

To: Shekter Smith, Liane (DEQ)

Cc: Lee, Lonnie (DEQ); Monosmith, Carrie (DEQ); Browne, Elizabeth (DEQ); Prysby, Mike (DEQ); Benzie, Richard (DEQ)

Subject: RE: Meeting with MDEQ March 20,21,22 or 26

Liane:

I don't see much need for my attendance. I have already addressed the water withdrawal issues with John O. The city of Flint has an established baseline capacity of 90 MGD (which they will never use) and the 85 MGD for the Karegnondi Water Authority (KWA) project was approved via application and issuance of a water withdrawal permit to Genesee County Drain Commission (GCDC) in 2009. The only thing to be aware of on the water withdrawal side of things is the some times talked about service to the village of Almont. They lie outside the Huron-Michigan basin and I don't believe water service to them would be covered by the existing water withdrawal permit issued to GCDC.

If you have any questions let me know - Brant

From: Shekter Smith, Liane (DEQ)
Sent: Wednesday, March 14, 2012 3:32 PM
To: Prysby, Mike (DEQ); Benzie, Richard (DEQ); Hoffman, Kelly (DEQ); Howard, Brock (DEQ); Fisher, Brant (DEQ)
Cc: Lee, Lonnie (DEQ); Monosmith, Carrie (DEQ); Browne, Elizabeth (DEQ); Skinker, Bethel (DEQ); Donaldson, Kristina (DEQ); Butler, Sonya (DEQ); Willard, Veronica (DEQ)
Subject: FW: Meeting with MDEQ March 20,21,22 or 26

Please see the note below.

Mike P., I'm assuming you'd be the lead on this project.

Who else needs to be included in this meeting? Looks like a significant change from our previous meeting. John O. is suggesting that Brock and Brant be included. Your thoughts?

Kelly – do you wish to participate at this time or wait until there's actually a proposal on the table?

Liane J. Shekter Smith, P.E., Chief
Resource Management Division
Michigan Department of Environmental Quality
517-373-9523
-----Original Message-----
From: John O'Malia [mailto:jcomalia@gmail.com]
Sent: Wednesday, March 14, 2012 3:20 PM
To: Shekter Smith, Liane (DEQ)

Subject: Meeting with MDEQ March 20,21,22 or 26

Liane-Flint wishes to meet with you etal on any day listed above. GCDC will also be in attendance. We wish to discuss the option for Flint City to Blend with DWSD water? Also, if they are allowed to blend what improvements, in the interim, until the KWA project is fully online [say 3 years]. Also, blending for 3 years and improving the Flint water plant, as a 365 day facility, using Flint River water, and they not join KWA? Other items for sure but in substance these are the main topics. We suggest at 1ish meeting. Mike Brown [EM] and his staff to present, GCDC in attendance and myself. Suggest Mike be in attendance, Brock, Benzie and maybe Brent as water quality and withdrawal maybe issues in play. If the Flint WTP is to be a 365 facility,using Flint river water, is there going to be a NPDES [withdrawal/dilution] issue at the downstream WWTP due to WTP withdrawal? Flint withdrawal rate to be 20MGD max. day.
Your thoughts. I called today and left a message with your assistant regarding this meeting.Also called Mike as it appeared your number had changed. Have not heard from Mike.
Let me know what is best for you and staff.
It appears, if Flint does not go with KWA, that GCDC and customers will go alone.
John O'

4/14 reply

Preliminary Stats on Genesee County Legionellosis Investigation,

As of April 7, 2015

Number of lab-confirmed cases of Legionnaires' Disease: 45

Number of Pontiac fever cases: 1 possible

Total number of legionellosis cases: 46 - By June 2015

Geographic distribution:

45/46 Genesee Co (27 Flint, 6 Mt. Morris, 4 Burton, 2 Flint Twp, 1 Flushing, 1 Byron, 1 Davison, 1 Linden, 1 Otisville, 1 Vienna Twp)

1/46 Saginaw County (1 Chesaning)

Age range: 26-94 years

Average age (median): 62.2 years (63.5 years)

% Males: 50% (23/46)

Range of illness onset dates (n=45): 6/6/14-3/9/15

Number (%) of deaths: 15.2% (7/46); expect this number will increase as interviews are completed

Number (%) with other underlying comorbidities: TBD

Conference calls with Genesee County: Jan 27; Feb 10, Feb 19, Apr 7, 2015

Conference calls with hospitals: Jan 28, 2015

Date outbreak-specific survey completed and approved: 2/23/15

Number of cases interviewed: 21 completed (45.7%; 82.6% in total attempted/completed)

MDCH: 14 completed / 29 contacted (MDCH had 2 interviewers – now increased to 4)

Genesee: 7 completed / 10

Number (%) of cases hospitalized: 45/46 (97.8%). Number in ICU: 22/45 (48.8%)

Number (%) of cases hospitalized at McLaren: 18/45 (40%)

Number (%) of cases hospitalized at Hurley: 14/45 (31%)

Number (%) of cases hospitalized at Genesys: 6/45 (13.3%)

Number (%) of cases hospitalized at other hospitals outside Flint: 7/45 (15.6%)

Number (%) of cases who had been hospitalized in 2-weeks prior to onset: 20/45 (44.4%)

Number (%) of cases who had been hospitalized in 2-weeks prior to onset at McLaren: 16/45 (35.6%)

Number (%) of cases who had been hospitalized in 2-weeks prior to onset at Hurley: 2/45 (4%)

Number (%) of cases who had been hospitalized in 2-weeks prior to onset at Genesys: 0

Number (%) of cases who had been hospitalized in 2-weeks prior to onset at other hospitals: unknown

Number (%) of cases who had a short-term visit to a hospital in 2-weeks prior to onset:

Number (%) of cases who had a short-term visit to McLaren facility in 2-weeks prior to onset: 5/45 (11.1%)

Number (%) of cases who had a short-term visit to Hurley facility in 2-weeks prior to onset: 1/45 (2%)

Number (%) of cases who had a short-term visit to Genesys facility in 2-weeks prior to onset: 0

Number (%) of cases who had been hospitalized or who had a short-term visit to a hospital facility in 2-weeks prior to onset:

Number (%) of cases who had been hospitalized or who had a short-term visit to a McLaren facility in 2-weeks prior to onset: 21/45 (46.7%)

Number (%) of cases who had been hospitalized or who had a short-term visit to a Hurley facility in 2-weeks prior to onset: 3/45 (6.7%)

Number (%) of cases who had been hospitalized or who had a short-term visit to a Genesys facility in 2-weeks prior to onset: 0

Number (%) of cases who work outside the home: 8/46 (17.4%) [min of 72% at home]

Number (%) of cases who are retired: 20 (43.5%)

Number (%) of cases who are unemployed: 7/46 (15.2%)

Number (%) of cases who are disabled: 6/46 (13%)

Number (%) of cases whose occupation status is unknown: 5/46 (10%)

Report 8: Epi-Curve Graph

Time Period: 01/01/2010 - 04/14/2015

Time Breakdown: by Month

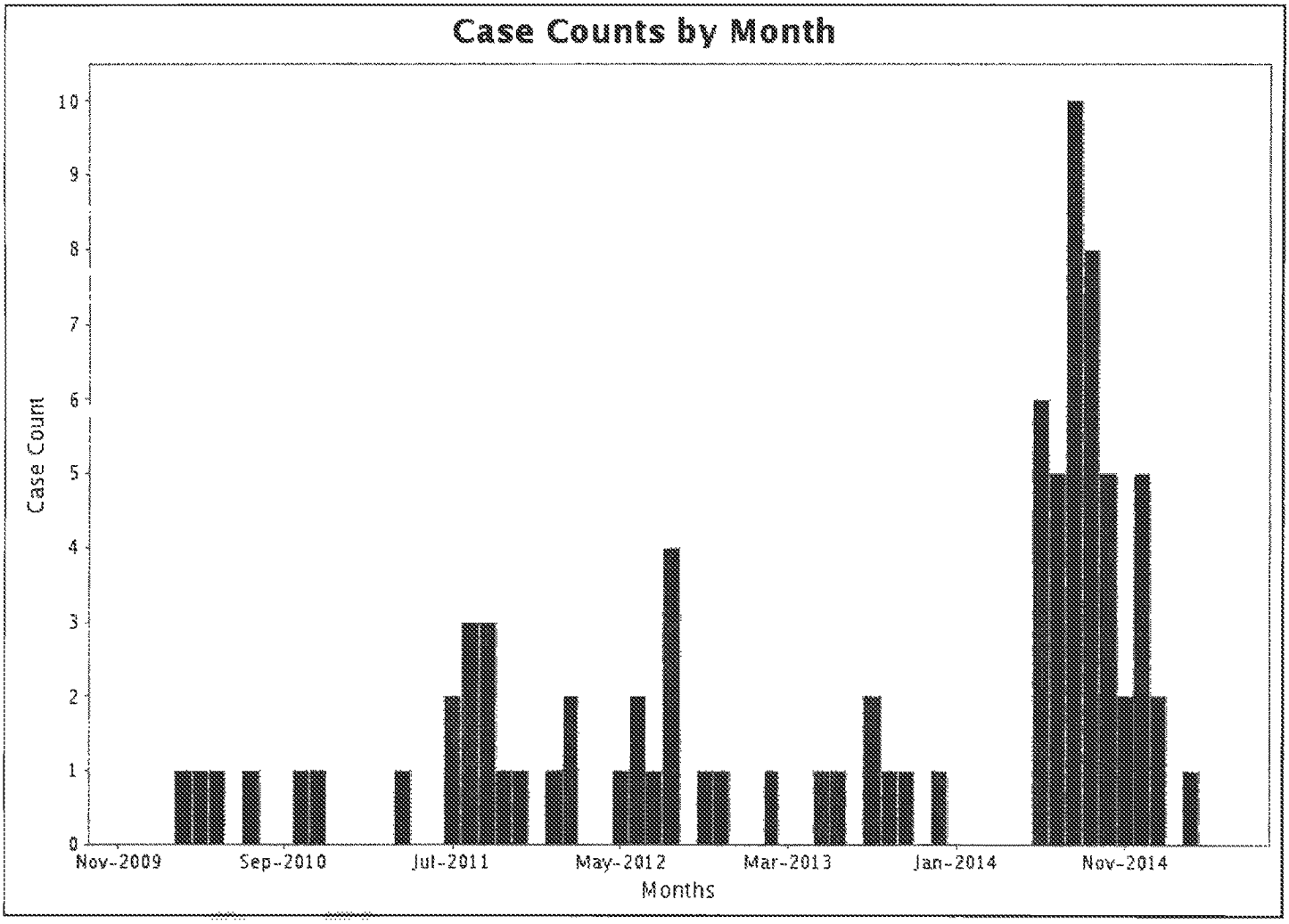
Reportable Condition: Legionellosis

Case Status: Confirmed, Probable, Suspect, Unknown

Investigation Status: Active, Completed, Completed - Follow Up, New, Review

Jurisdictions:
Genesee County

Case Types: Individual and Aggregate

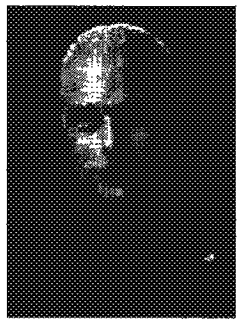


Month	Total
MAR 2010	1
APR 2010	1
MAY 2010	1
JUL 2010	1
OCT 2010	1
NOV 2010	1
APR 2011	1
JUL 2011	2
AUG 2011	3
SEP 2011	3
OCT 2011	1
NOV 2011	1
JAN 2012	1
FEB 2012	2
MAY 2012	1
JUN 2012	2
JUL 2012	1
AUG 2012	4
OCT 2012	1
NOV 2012	1

Month	Total
FEB 2013	1
MAY 2013	1
JUN 2013	1
AUG 2013	2
SEP 2013	1
OCT 2013	1
DEC 2013	1
JUN 2014	6
JUL 2014	5
AUG 2014	10
SEP 2014	8
OCT 2014	5
NOV 2014	2
DEC 2014	5
JAN 2015	2
MAR 2015	1

Low bid is $24.6 million on Genesee Huron water pipeline intake

By Ron Fonger | rfonger1@mlive.com (http://connect.mlive.com/user/rfonger/posts.html)
on February 28, 2013 at 7:00 AM, updated February 28, 2013 at 7:08 AM
Print (http://blog.mlive.com/newsnow_impact/print.html?entry=/2013/02/low_bid_on_karegnondi_water_pi.html)


Jeff Wright

GENESEE COUNTY, MI -- L. D'Agostini & Sons Inc., a Macomb-area contractor, says it can build a **massive intake into Lake Huron (http://www.mlive.com/news/flint/index.ssf/2012/10/beneath_the_surface_her** for $24.6 million, the first step toward construction of a new water pipeline.

County Drain Commissioner Jeff Wright said he was "very, very pleased" with the results of the five bids opened Tuesday, Feb. 27.

Three of the bids to do the job for the Karegnondi Water Authority were for less than county engineers had estimated -- $27 million.

Bay City
Detroit
Flint
Grand Rapids
Jackson
Kalamazoo
Lansing
Muskegon
Saginaw
All Michigan
Search
Sign in

Wright stopped short of announcing L. D'Agostini & Sons as the low bidder, saying his office was examining bids and supporting documents in conjunction with a county water and waste advisory board.

The drain commissioner's office would recommend the low bidder be awarded the contract, provided the company's bid and paperwork are in order.

MLive-Flint Journal could not reach a representative of L. D'Agostini & Sons of Macomb Township for comment Wednesday, Feb. 27.

"We hope to make a decision shortly," Wright said in a news release. "I believe the bids were competitive, and within the projected range of what we expected, if not lower."

Karegnondi is the regional water authority that includes Genesee, Lapeer and Sanilac counties and the cities of Flint and Lapeer.

The authority was formed to build a new water pipeline to Lake Huron, putting those communities in position to supply their own fresh water rather continuing to purchase treated water from the city of Detroit.

County officials have said they intend to build the pipeline regardless of whether the state of Michigan allows the city of Flint to join the authority.

Wright said construction of the intake could begin in spring.

The first phase of building the pipeline is a massive undertaking in itself, requiring divers who will connect sections of a 72-inch-diameter intake pipe underwater and the use of power augers to open tunnels under the beach and lake floor.

The entire pipeline project's estimated cost is $274 million.

Here are the bidders for the intake work, according to the drain commissioner:

- L. D'Agostini & Sons, Macomb Township: $24.6 million
- Schoolcraft Constructors, Inc., Livonia: $25.8 million
- Southland Mole JV, Fort Worth, Texas: $26.8 million
- Ric-Man/Super Joint Venture, LLC, Sterling Heights: $27.9 million

Proposed Agenda
KWA and Flint Water Plant Issues
March 20, 2012 – 1:00 p.m.
MDEQ – Constitution Hall

- Attendees
  - Introductions and sign-in

- Updates and current status of KWA – Lake Huron raw water initiative

- Discussion on blending treated water from Detroit with Flint water plant effluent
  - Flint River Study – capacity and dilution factors for waste water treatment plants (If Flint represented at meeting)
  - Interim operation during KWA construction

- MDEQ concerns over redundant water supply to Genesee County

- MDEQ guidelines for intake permitting process:
  - Permit requirements to allow construction of intake to begin in August or September 2012
  - Likely MDEQ staff assigned to review and permitting

2 Actions to take to DWSD

1. — Buy 72" line & run as Lake Source
— & use River as redundant source

2. — Acquire for Full time use

Talk us your reliability reqts —
Redundancy to meet Avg day

3. No sell 72" line — Buy
Run Full KWA line

4. Verify HAM DAM Level
Confirm they HAM DAM does not need to be expanded

Proposed Agenda
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  - Permit requirements to allow construction of intake to begin in August or September 2012
  - Likely MDEQ staff assigned to review and permitting

→ backfeed the 72"

signal and control. Send Use From Plant + walls (54+84) + Beecher Metro

Alternative = FMCD

ia — for Black-out

= 72" inch - depth where

Name	Representing	e-mail
David Vansen	Gen Co. D.C.	dvansen@gcdcwws.com
Richard Benzie	DEQ - Community Program	benzier@michigan.gov
Daugherty Duffy Johnson	City of Flint	djohnson@cityofflint.com
BRENT WRIGHT	" "	bwright@cityofflint.com
Liane Shekter Smith	DEQ - RMD	shekterl@michigan.gov
Howard Croft	CITY of FLINT	hcroft@cityofflint.com
Bethel Skinker	DEQ	skinkerb@michigan.gov
Michael Prysby	DEQ	prysbym@michigan.gov
Brock Howards	DEQ	howardbl@michigan.gov
Brant Fisher	DEQ	fisherb@mi.gov
CHARLES BENNETT	DEQ - Water Resources	bennettc4@michigan.gov
John O'MALIA	O'MALIA Consulting	JCOMALIA@gmail.com
John O'Brien	GCDCWWS - KWA	jobrien@gcdcwws.com
Matt Raysin	GCDCWWS	mraysin@gcdcwws.com

CUSTOMER FOCUS
Rating: HP - High Performing ✓

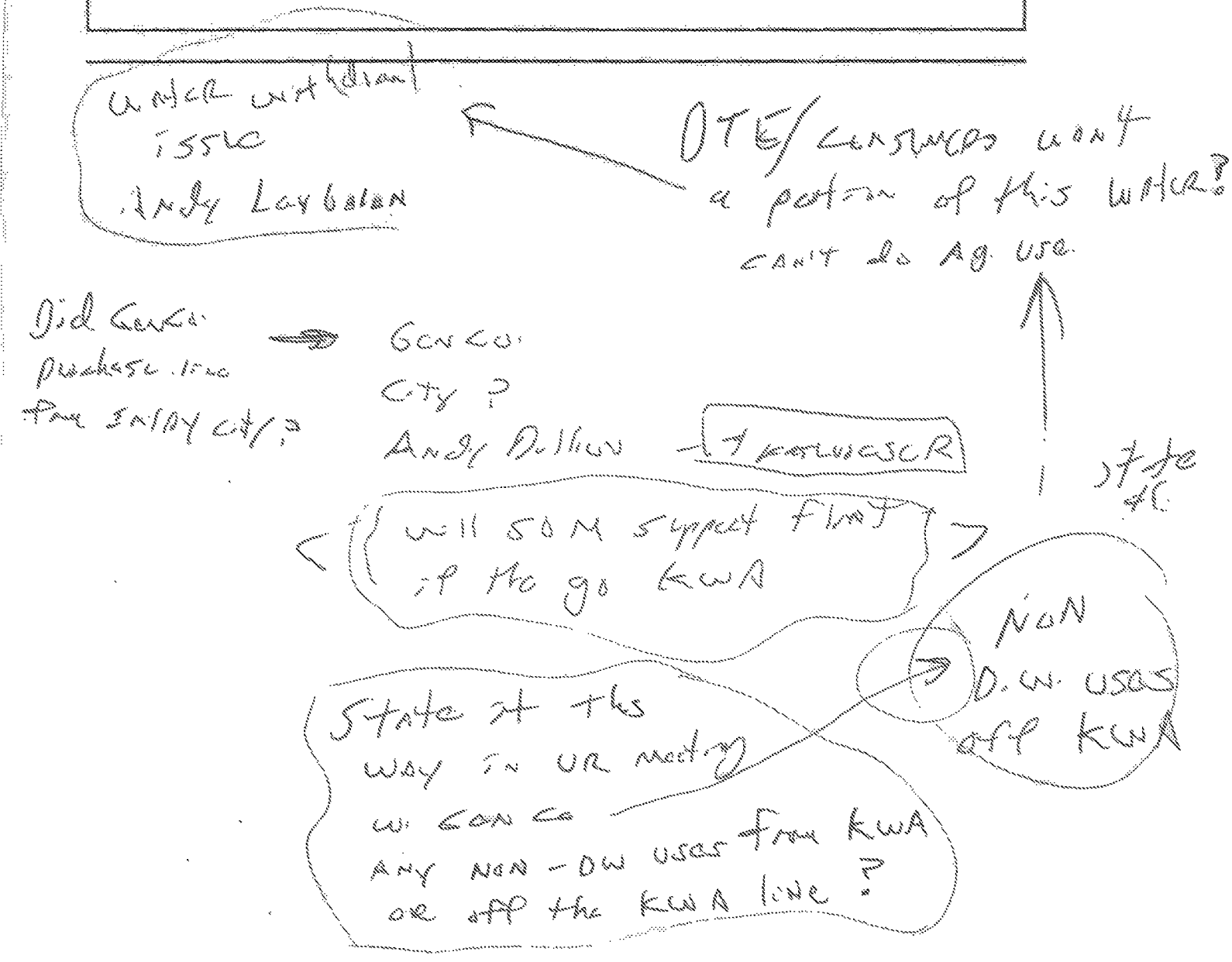
Description:
Making customers and their needs a primary focus of one's actions; developing and sustaining productive customer relationships.

Comments:
The DE has excellent customer relationships with major stakeholders, operators, and consultants. This reflected in the many telephone conversations, meetings, correspondence, and email that the DE has on a daily basis.

FOLLOW UP
Rating: HP - High Performing ✓

Description:
Monitoring the results of delegations, assignments, or projects, considering the skills, knowledge, and experience of the assigned individual and the characteristics of the assignment or project.

Comments:
The DE follows up on phone calls, email, and tracks the results of assignments and projects in a timely manner



ORIGINAL PROJECTION
SUMMARY COMPARISON: KWA V DWSD

Water and Sewer Cash Flow with KWA

	Year 1 FY13	Year 2 FY14	Year 3 FY15	Year 4 FY16	Year 5 FY17	Year 6 FY18	Year 7 FY19	Year 8 FY20
Current DWSD & FWTP Costs	$ 14,413,858	$ 15,355,135	$ 16,365,534	$ -	$ -	$ -	$ -	$ -
KWA Entry Fee	$ 581,400	$ 581,400	$ 581,400	$ -	$ -	$ -	$ -	$ -
KWA Debt	$ -	$ -	$ -	$ 6,593,155	$ 6,593,155	$ 6,593,155	$ 6,593,155	$ 6,593,155
FWTP Debt	$ -	$ -	$ -	$ 484,044	$ 484,044	$ 484,044	$ 484,044	$ 484,044
KWA operations	$ -	$ -	$ -	$ 876,869	$ 922,812	$ 968,953	$ 1,017,401	$ 1,068,271
FWTP operations w KWA	$ -	$ -	$ -	$ 6,843,344	$ 7,185,511	$ 7,544,787	$ 7,922,026	$ 8,318,126
Total Costs	$ 14,995,258	$ 15,936,535	$ 16,946,934	$ 14,799,412	$ 15,185,523	$ 15,590,939	$ 16,016,626	$ 16,463,697

Water and Sewer Cash Flow with DWSD

	Year 1 FY13	Year 2 FY14	Year 3 FY15	Year 4 FY16	Year 5 FY17	Year 6 FY18	Year 7 FY19	Year 8 FY20
Current DWSD & FWTP Costs	$ 14,413,858	$ 15,355,135	$ 16,365,534	$ 17,450,717	$ 18,616,651	$ 19,870,650	$ 21,219,435	$ 22,671,185

Cash Flow Difference: KWA and DWSD

	Year 1 FY13	Year 2 FY14	Year 3 FY15	Year 4 FY16	Year 5 FY17	Year 6 FY18	Year 7 FY19	Year 8 FY20
Annual Cost: DWSD - KWA	$ (581,400)	$ (581,400)	$ (581,400)	$ 2,651,305	$ 3,431,128	$ 4,279,711	$ 5,202,809	$ 6,207,488
Cumulative Gain with KWA	$ (581,400)	$ (1,162,800)	$ (1,744,200)	$ 907,105	$ 4,338,433	$ 8,618,144	$ 13,820,953	$ 20,028,541

(1) This projection assumes that KWA begins delivery of water to Flint starting in July, 2016. Any interest on the bonds will be capitalized until that period. The City will be obligated to begin paying its entry fee of $581,400 in FY13.

(2) Cost of KWA option is projected to be $907,105 or 15% LESS than DWSD in the first year of operation (Year 4)

(3) Cost of KWA option is projected to be $6.2 million or 27% LESS than DWSD in the 5th year of operation (Year 8)

(4) Cumulative savings by the 8th year from the beginning of the project are projected to be $24 million

Detail of Original Cost Projections

Cost Comparisons: Water Supply to City of Flint from DWSD and proposed KWA project

Cost of Water to City of Flint (excluding Genesee) using continued service from DWSD

	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
Fixed Cost (1)	$ 4,411,680	$ 4,852,848	$ 5,338,133	$ 5,871,946	$ 6,459,141	$ 7,105,055	$ 7,815,560	$ 8,597,116
Escalator	1.1	1.10	1.10	1.10	1.10	1.10	1.10	
Commodity Cost (2)	$ 7,276,640	$ 7,640,472	$ 8,022,496	$ 8,423,620	$ 8,844,801	$ 9,287,041	$ 9,751,394	$ 10,238,963
Escalator	1.05	1.05	1.05	1.05	1.05	1.05	1.05	
Flint WTP Operating Cost (3)	$ 2,725,538	$ 2,861,815	$ 3,004,906	$ 3,155,151	$ 3,312,908	$ 3,478,554	$ 3,652,482	$ 3,835,106
Escalator	1.05	1.05	1.05	1.05	1.05	1.05	1.05	
TOTAL	**$ 14,413,858**	**$ 15,355,135**	**$ 16,365,534**	**$ 17,450,717**	**$ 18,616,851**	**$ 19,870,650**	**$ 21,219,435**	**$ 22,671,185**

(1) Per FY13 Budget and DWSD Contract, fixed charge from DWSD for FY13 is $707,000 per month or $8.5 million total. Flint's cost is 52% or $4.4 million total.

(2) Per FY13 Budget and DWSD Contract, and based on 12 million gallons per day (mgd), cost is $7.3 million, based on $12.46/unit ($12.46x1600unitsx365).

(3) Per FY13 Budget, annual cost of WTP is $4.1 million. Genesee County pays $1,386,000 for emergency back up service.

Cost of Water to City of Flint using proposed KWA project for water supply to Flint WTP

	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
KWA Entry Costs (1)	$ 581,400	$ 581,400	$ 581,400		$ -	$ -	$ -	$ -
Fixed KWA Construction Cost (2)				$ 6,593,155	$ 6,593,155	$ 6,593,155	$ 6,593,155	$ 6,593,155
Escalator				1.00	1.00	1.00	1.00	
Fixed Flint WTP Construction Cost (3)				$ 484,044	$ 484,044	$ 484,044	$ 484,044	$ 484,044
Escalator				1.00	1.00	1.00	1.00	
Flint WTP Operating Cost (4)	$ 5,911,538	$ 6,207,115	$ 6,517,471	$ 6,843,344	$ 7,185,511	$ 7,544,787	$ 7,922,026	$ 8,318,128
Escalator	1.05	1.05	1.05	1.05	1.05	1.05	1.05	
KWA Commodity Charge (5)	$ 759,200	$ 797,160	$ 837,018	$ 878,869	$ 922,812	$ 968,953	$ 1,017,401	$ 1,068,271
Escalator	1.05	1.05	1.05	1.05	1.05	1.05	1.05	
TOTAL	KWA NOT AVAILABLE			**$ 14,799,412**	**$ 15,185,523**	**$ 15,590,939**	**$ 16,016,626**	**$ 16,463,597**

(1) The City will, upon joining, be required to pay a fee of $32,300 per MGD for each year until bonding for the project is obtained. At 18MGD, the City's cost is $581,000 annually. It is projected that fee will be assessed for 3 years.

(2) Per KWA proposal, project cost is $272 million. City's fixed cost would be 30% of debt service, based on capacity design of 60mgd, of which 18MGD is for Flint. Debt service is based on 5% interest rate @ 25 years; 5% added to principal for capitalized interest for FY13, FY14, and FY15. ($272,421,588 plus $13,621,078 for 3 years = $313,284,792)

(3) Per KWA proposal, the cost of upgrading the Flint is $6 million. City's fixed cost would be100% of debt service based on 5% interest rate @ 25 years), with 5% added to cover capitalized interest for FY13, FY14, and FY15. (total principal = $6.9 million)

(4) Per FY13 Budget annual cost of WTP is $4,111,538. $1.6 million for electricity and chemicals & 2 FTE's are added. 100% City cost. 100% of

(5) Per KWA proposal, initial commodity charge would be based on $1.30/unit or 7,500 gallons. Charge is based on 12MGD.

CITY OF DETROIT
WATER AND SEWERAGE DEPARTMENT
OFFICE OF THE DIRECTOR

735 RANDOLPH STREET
DETROIT, MICHIGAN 48226
WWW.DETROITMI.GOV

April 15, 2013

Karengondi Water Authority
4160 Beecher Rd.
Flint, Michigan 48532-2617

Ed Kurtz, Emergency Manager
City of Flint
1101 South Saginaw Street
Flint, Michigan

517 843-2314

Gentlemen:

Over the last several months, governed by a process laid out by the State of Michigan, the Detroit Water and Sewerage Department (DWSD) has proposed a number of alternatives for long term water supply to the City of Flint. Each alternative was offered in the spirit of working in earnest to address the needs, priorities and concerns of the City of Flint and each provided an immediate cost reduction when compared to the current costs of water purchased from DWSD. In the final analysis conducted by Flint, these proposals did not overcome the desire for the Flint/Genesee region to be served by the same system and to have a voice in the future decisions governing the provision of water to this region.

Many of the proposals DWSD has made to Flint during this period are applicable to Flint/Genesee County or KWA with adjustments to demand and use requirements and would provide similar overall benefit. These options remain available for further discussion should the parties' desire. These prior proposals are included in summary form in Attachment 1 as an expanded table 6-1 from the February 2013 State of Michigan Contract No. 271N3200089, City of Flint Water Supply Assessment, submitted by Tucker, Young, Jackson, Tull, Inc. For comparison purposes only, DWSD's new proposal (Flint's 30% allocated share) is inserted.

The proposal scenarios outlined today offer a public/public partnership with options tailored to Flint/Genesee County or KWAs interests. For ease of writing, the remainder of this memo will present this proposal to KWA. Two basic scenarios are presented for consideration, both of which contemplate that KWA would enter a multi-year contract. Service commitments and usage definitions would be negotiated in the same manner as employed that have resulted in new contracts for other customers.

In brief, the proposal provides a unique opportunity to reserve capacity at DWSD's Lake Huron Water Treatment Plant and to participate in decision making for facility operation and capital investment through a joint operating committee. The proposal envisions that KWA would enter into a 30-year contract to purchase treated water directly onsite at DWSD's Lake Huron Water Treatment Plant.

In Scenario 1 the purchased water can either be pressurized or unpressurized. This first scenario results in a "supply only" rate schedule, with a "standby delivery" component to provide for emergency service at the existing Baxter / Potter connection. This scenario provides KWA the ability to construct new transmission owned and operated by KWA.

Scenario 2 maintains the public/public partnership concept and extends it to transmission facilities through which the Lake Huron Water Treatment Plant provides water. This scenario results in a "full service" rate schedule. The standby delivery component is eliminated, since the rate structure to KWA includes costs associated with the transmission system between the Lake Huron Water Plant and the Baxter / Potter connection.

DWSD proposes a modified rate schedule for the customers currently served through the contract with the City of Flint, which includes Flint and Genesee County. This modified schedule is intended to facilitate negotiations for a new water service agreement with the Karegnondi Water Authority (KWA). The scenarios presented herein represent the innovative thinking that DWSD and its new leadership are bringing to the table. Our goal is to provide the lowest cost water solution for the KWA service area.

The potential rate structures are introduced in summary form herein, with preliminary calculations using the proposed rate structures with FY 2013-14 as a baseline. These calculations and the accompanying discussion are based on the assumptions regarding contract terms that approximate recent discussions amongst the parties.

The proposal introduces the concepts, but does not definitively present all of the specifics, appreciating that such specifics are best addressed through negotiations designed to produce a new contractual agreement satisfactory to all parties.

[Remainder of page intentionally left blank]

Scenario 1 – Lake Huron Direct Supply Purchase:

- KWA enters into a long term partnering arrangement with DWSD to purchase all of its primary water supply directly at the DWSD Lake Huron water treatment plant.
- Supply rate schedule is designed to recover only water treatment revenue requirements. This rate schedule does not contain any delivery costs (pumping, transmission, storage, etc.).
- Supply rate schedule is computed based on specific costs associated with the Lake Huron Plant. No other DWSD revenue requirements, including those associated with other DWSD water plants, are included in the rate to KWA.
- Revenue requirements are separated into capital recovery and operation and maintenance expense elements. Baseline revenue requirement data (including operating budget, rate of return, depreciation assumptions, etc.) are identical to those developed for all other wholesale customers.
- KWA is allocated Lake Huron Plant capital revenue requirements based on the proportion of their contracted max day demand (assumed in these calculations at 40.6 mgd) relative to the total capacity at the Lake Huron Plant (400 mgd). The resulting revenue requirements are recovered through a fixed monthly charge.
- KWA is allocated Lake Huron Plant operating revenue requirements based on the proportion of their contracted average daily usage (assumed in these calculations at 24 mgd) relative to the total average daily usage at the Lake Huron Plant (assumed at 125 mgd in these calculations).
- Calculations are conducted for two alternatives. Purchase of *pressurized* water (after high lift pumping) and *unpressurized* water (KWA takes directly from clearwell.)
- Contract includes an arrangement for emergency service at the existing Baxter / Potter connection, and computes a standby charge related to such service.
- The standby charge is computed in the manner set for the by the American Water Works Association (AWWA) in its Manual of Water Supply Practices M1 - "Principles of Water Rates, Fees, and Charges" Manual M1.
    - KWA is allocated one day's worth of transmission related capital revenue requirements.

Scenario 2 – "Full Service" Lake Huron System

- Same as the "pressurized" option in Scenario 1, except that concept is extended to the pumping, storage, and transmission facilities directly served by the Lake Huron Plant
- Transmission rate schedule is computed based on specific costs associated with these facilities. No other DWSD revenue requirements, including those associated with other DWSD transmission mains, etc, are included in the rate to KWA.
- Revenue requirements are separated into capital recovery and operation and maintenance expense elements. Baseline revenue requirement data (including operating budget, rate of return, depreciation assumptions, etc.) are identical to those developed for all other wholesale customers.
- KWA is allocated Lake Huron "transmission system" capital revenue requirements based on the proportion of their contracted max day demand (assumed in these calculations at 40.6 mgd) relative to the total capacity at the Lake Huron Plant (400 mgd). The resulting revenue requirements are recovered through a fixed monthly charge.

- KWA is allocated Lake Huron "transmission system" operating revenue requirements based on the proportion of their contracted average daily usage (assumed in these calculations at 24 mgd) relative to the total average daily usage at the Lake Huron Plant (assumed at 125 mgd in these calculations).
- Standby charge is eliminated.

The resulting potential proposed rate structures under both Scenarios are summarized below.

Potential Proposed DWSD Water Rate to KWA
Lake Huron Direct Scenario

	1 - Supply Rate @ LH Plant		2 - Full Service
	Unpressurized	Pressurized	Wholesale Rate
Supply Rate			
Fixed Monthly Capital Charge - $	219,900	316,600	503,200
Commodity Rate - $/Mcf	2.60	4.16	5.31
Average Unit Cost - $/Mcf	*4.85*	*7.40*	*10.46*
Monthly Standby Charge	167,500	110,300	0
Total Monthly Charge	387,400	426,900	503,200
Total Average Unit Cost - $/Mcf	*6.57*	*8.53*	*10.46*

180 M.11 over 30 yrs
503 M x 360 mo
= 180 M.11

The direct comparison over the period 2013-2042 is demonstrated in Attachment 2.

As KWA considers this proposal, I offer the following observations for consideration:

- The Public Partnership requires the least near term capital investment and preserves the economy of scale associated with operation of a large regional system resulting in an immediate reduction in the cost of water supply for Flint/Genesee, making the identified and necessary near term investment in local water infrastructure more feasible.
- The Public Partnership provides the opportunity to optimize service level and efficiency through collaborative asset management decision making.
- The Public Partnership provides representation for critical decision making consistent with DWSD newly demonstrated interest in engaging our customers in critical decisions impacting them. This formalizes that interest in contractual terms.
- The Public Partnership reduces the risks identified with a 'go alone' solution, including further declines in use/sales (see graph), project cost overruns or schedule delays and other unforeseen costs inherent in starting a new venture. See Attachment 3
- The DWSD Board of Commissioners has previously approved sale of raw water from the Lake Huron facilities for raw water end use. We remain open to further discussion about the raw water capacity needs and stand ready to provide an affordable commodity option.

$?
586 M.11
Attach. 1

DWSD is an organization in transformation. In April of 2011, a new Board of Commissioners was seated with additional autonomy and more direct customer representation. In the past year we have demonstrated the ability to reduce costs, resolve long standing compliance issues and have gained support for establishing a new legal and operational model for DWSD that could enable broadened representation for Flint/Genesee on the Governing Board.

I remain available to discuss this proposal to assure that each of the issues critical to Flint/Genesee are addressed.

Best regards,

Sue McCormick, Director
Detroit Water and Sewerage Department

Cc: Andy Dillon, State Treasurer
Dayne Walling, Mayor – City of Flint
Kevyn Orr, City of Detroit Emergency Financial Manager
Jeff Wright, Genesee County Drain Commissioner
James Fausone, Chair – Detroit Board of Water Commissioners

Attachment 1

How?

DWSD Water Supply Costs Estimates to Flint

Option	Water Supply Costs ($) through 2042	Ranking by Cost
DWSD 4/15/2013 Scenario 2	587,990,630	1
DWSD 8 MGD Max Day @ Imlay	634,795,488	2
*KWA (10/31/12 No Overruns, As Provided) **	649,775,166	3
DWSD 8 MGD Max Day @ Baxter / Potter	672,671,705	4
KWA-1 (10/31/12 No Overruns with Financing Costs)	707,279,715	5
DWSD 12 MGD Max Day @ Imlay	725,576,803	6
DWSD 12 MGD Max Day @ Baxter / Potter	762,110,308	7
KWA-2 (Treasury Estimate)	766,784,313	8
DWSD 12 mgd Twin Line Proposal / No blending	818,092,150	9
DWSD 18 MGD Max Day @ Baxter / Potter	821,226,268	10

$588,000,000
- 650,000,000
$62,000,000 D-A

Italicized Options as presented in TYJT Report

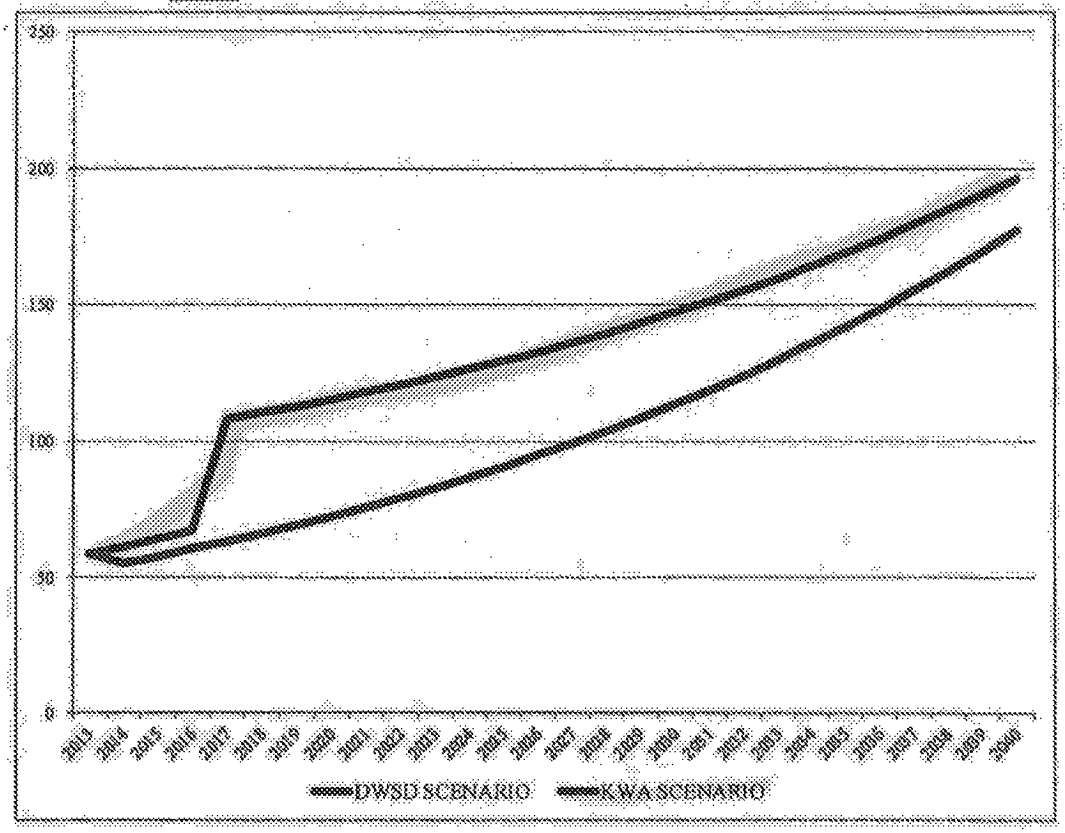
DWSD Water Supply Costs Estimates to Flint / GCDC
$ millions

Option	All Water Costs ($) through 2042	Ranking by Cost
DWSD 4/15/2013 Scenario 2	3,282.00	1
Estimate of KWA	4,090.06	2

$800 Mil ?

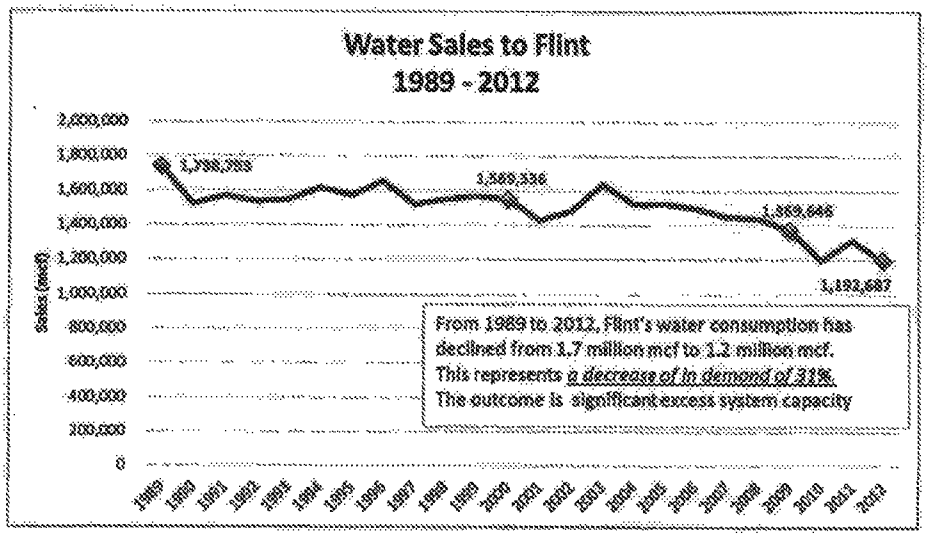
Attachment 2

SUMMARY OF **TOTAL** PROJECTED WATER COSTS TO FLINT/GCDC - SCENARIO COMPARISON *($ millions)*



what happens after 2042 as well KWA drops

Attachment 3



Update

Met w. Ed Kuntz
drafting rep. ltr — to discuss
w. A Dillon

— Press Conf. @ 4:30 PM

City of Flint

Public Forum

Wednesday January 21, 2015
7:00 pm City Hall Dome

AGENDA

Opening COF – DPW Director - Howard Croft

- Forum Ground Rules (disorderly conduct will not be tolerated)
- Overview of Format (each guest to speak for ~10 minutes with written questions afterword)
- Recognition of Officials
- Introduction of Guests

1st Speaker DEQ – Local Representatives - Mike Prysby, Steve Busch

- Role of DEQ
- Explanation of TTHM violation

2nd Speaker LAN – Lead Engineer - Warren Green

- Discuss Engineering role
- Discuss Operational Evaluation Report

3rd Speaker MSU Microbiologist – Dr. Joan Rose

- Risk Assessment (what do the numbers mean?)
- What to do if someone suspects they are at risk
- What about the elderly and those with a weak immune system
- What will the next violation mean (water is still safe)

4th Speaker GCDC – Jeff Wright

- What to expect from KWA raw water as source
- Update on KWA timeline

Final COF – DPW Director – Howard Croft

- Summary (Next Steps – Action Plans)
  - Hiring an industry expert
  - Tours of Treatment Plant
  - Continued communication
  - Planned steps (CIP built on , Water Reliability Study, Operational Evaluation Report)
  - Funding (researching all sources, state funding, federal opportunities)
  - Water & sewer rates (budgetary evaluation upcoming)
- Questions (Expected to have an hour of panel response time)
- Conclusion - Thank the panel, (Additional follow up at next Public Works Committee meeting)

Department of Environmental Quality (DEQ)

Michael Prysby, P.E.
District Engineer

Stephen Busch, P.E.
Lansing and Jackson District Supervisor

Lockwood, Andrews, and Newnam (LAN)

J. Warren Green, PE
Senior Associate, Director of Engineering

Warren has more than 30 years of experience in engineering management and supervision of complex water treatment and transmission facilities projects. He has successfully guided water system improvements through all necessary phases including feasibility studies, pilot testing, design, financial evaluation, land acquisition, construction, start-up and operation. His expertise is in the areas of facilities design, construction management and contract administration.

He has worked with several municipal utility clients throughout Illinois, Mississippi, Michigan and Wisconsin. He worked with the Green Bay Water Utility in Green Bay, Wis., for 12 years, serving as a project manager for a number of design and contract administration tasks. These included the expansion of a 10-mgd raw water pumping station, construction of approximately 17 miles of 54-in. steel water transmission main, and expansion of its water treatment plant in 1997 and 2004. He also oversaw a $376 million project in DuPage County, Ill., where he was responsible for contract administration and construction management of 140 miles of water transmission mains.

MSU Water Quality and Environmental Microbiology Laboratory

Dr. Joan B. Rose, Ph.D.
Laboratory Director/Principal Investigator
Homer Nowlin Chair in Water Research
Co-Director Center for Water Sciences
Co-Director Center for Advancing Microbial Risk Assessment

Joan is an international expert in water microbiology, water quality and public health safety and is a member of the National Academy of Engineering. She has been involved in the investigation of numerous waterborne outbreaks world-wide. Her work addresses the use of new tools for surveying and mapping water pollution for recreational and drinking water; assessment of water treatment technology and use of risk assessment.

Degrees:

- Bachelor's (1976) and Ph.D. (1985), microbiology, University of Arizona
- Master's (1980) microbiology, University of Wyoming

Genesee County Drain Commissioner

Jeff Wright

Past positions include:

- Chief Executive Officer of Karegnondi Water Authority
- Legislative Committee and Executive Board of Michigan Association of County Drain Commissioners
- Northeast District Chairman – Michigan Association of County Drain Commissioners
- Former Secretary/Treasurer – Michigan Association of County Drain Commissioners

DNA
Dc brwn
Nov 5th 2014

Prep 2014

5/6/15 — In-house meeting

5 wks → 50 wks Report

not specified / Letters what in the memo

Cu & sodium silicate fed

Two summary Hosp visits

- Flow Proced
- # of readings
- Meters
- SCADE
- Logic of Network

Logistics — ext policy
Prosal — mem
RFP: any pitch — regs
DOE / Perkins → Jeffrey Tillotson

Refs (Low ex VSH)

CWS or NEWS?

Strategy on how to progressively handle this

- Mon review of Wkst Hyphae
- results — Insp results
- Of Cost D-S? on own staff or CWS agency/agreement & Agree of overseer to detail — 5 yrs to exhaust

Annual Feed — should be established...

* Outreach for assistance to standing injectors at the value $

Permit to install treatment

DLNR

We will work with the divers

Pet in water (CARE to draft)

If [illegible] am offw,

extraction point, need attach,

initial kits to customer with your

O/A docs / EHO, yes/no

time to go 1-2 y from time to

Agree Or. out

NO — start w. Base one

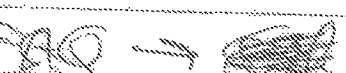
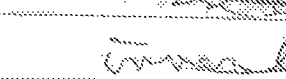
CP from us via the dept

sometimes duplicate permits

DLNRA / Plumbing Board → we need
& Rep from folks in Eq Imp F
the meeting before we send more
stuff out



We use McClain / get Chris updated
McClain now → let's get the cha
fuel make updated

FAQ →  single copy?
FAQ → RBR
— Get Mtg to discuss ex. Stds
outer limits
— FAQ ITR
—  cost of being on
timeclock?

/

X Ecology on Chs
System = Hyd
chart of stem
stem flow
scale, neck
Dig. Rock Kit Needs

McClure Mtg 4/29/15

Op. / Pathol / Mgt of Power Plumbing

Infection control

Safety

Emergency

ETOH poly — natural cure — decolonization

Starting on surgical instruments, then ICUs

Orange antigens (AS) — Low risk → Direct to high risk

Cases

Summary of study since Sept 14

Some fund, Store water bottle

Collect & std protocol

Swimming pool test since Sept 14
some FunOs, 500m water tests
Call Ct ⇒ est. pattern

Referral Consult — testing, LDP to
est. control Mts for testing
Chlorine tk water & test residuals
Hypo Cl2 / GAC / Flush
Acid spill → new agent no 5-10 staff/agencies

EMS — Center Medical — 9 Reg Agency
MICOSTA

McCleary — Retail policy
HyperCl — 2 week ago
Conductivity testing for L this week

Policy of running the water / V Sys.
Nalco — op. / controller for Backup / cooler
- Cl2 → 4x ClO2 — need to stop
water usage
↳ McCleary Boosts Cl2 → ≥ 0.5 PPM

at MCN

Eulgano → managing the risk
Pipe composing in chilled water towers
Protocol is being developed for sampling

Now the residual? → yes
Temp?

Lone Analyst did not confirm the L was from McLaren
Hurley
Amy Powell – Imp control MGR
Nickel MGR
GCMS Dennis ↑ L
inhalation
VHA may have assessment for!
OEP case book now open Hosp Agent
E: kemayer@hurley.mc.com
Policy (L) Hosp biological

MAP – sketchy at best esp a able wage
Calumet could for workflow
a control program
any treatment? NONE
Contraindicated
Report w/ guidance

Visit Types for Plant/Hosp visit Hab

- Known Progrm @ each hosp.
  - Service line Protection (City)
  - Indiv. Protection – city inspects internal Plumbing

- cap Plumbing sys
  except of inspects w. bldg chilling towers coolers, etc

Dora

wm Brooks

- Procedures
- Maintenance to collect long res. done then

Thurs 3/26/15 ASDWA

Legionella Webinar

- Treatment in Premise Plumbing
  Janet Stout – Univ. of Pitts

- What's new
- Shift – DW/ not cooling towers
- Prevention
- Role of Environ Surveillance
- Targets for Osem control
- Disinfection Measures

Susceptible Pops
- Old
- Smokers
- ≥ 25% no risk factor above
- Immunocompromised

Transmission
- Eq. to HW or L (Pathogenic)
- Eq. or L → aerosol
- Mode of Entry (aerosolization)

- Aspiration

(2)

Sum of L Disease
- Rare 2-5% w. Pneg
- Patches w. ant. Clear(y)

Occurs
20-70% of PNGx colonized w. L
Sx: of Pt

Hot < 122°F heaters
Pipes > 10 Years
Loss of Service Assoc.

Why ↑ in cases (3)

- Better reporting
- ↑ in Diagnostic testing
- Service failure - wet weather - affect source water Q.of L

NO ≈ 30k cases/yr of L
35% of cases from hosp } 15.3+L
25% case fatality rate } 100 hrs

L not a Dno - Nat. acc/community consortium

Use strongest antibiotics - amoxicillin other bad gram neg's - Isotrecin

Source → Incoming potable H2O
undetectable Hs → cold H2O
↓ Biofilm
grows in warm water

Public H2O Cultures
Nothing sure of L. freemen

Pos hist not effects

- Operational Def.
- EOA conclusive treatment tech to control

- CWS Manual or Sig source of L coming out this month

Poss
1. Low flow
2. Low Cl_2
3. Little mixing of Stage
4. No Reg Flushing

Rec → Inc flows as poss source
Treatment can apply L

Take action in absence of disease

Be Proactive before cases/environment

Disinfection Options in Hospc. (5)

Hand Stock
>10PPM Cl2
Flush - 30 min
160-120°F

Contains

CWS
Cl2
ClO2
Monitoring
UV

Bldg
connection

Also ROU
Copper Silver ionization

Leaching of Cu stuck Dissolved
within several weeks

Cl2 - less $, less effective
2-5 ppm
Flush to 2 mg/L
2HR Hold time

byCl2
TTHM, corrosion
Re-growth

Cl2 concerns
- Leaves to 6 ppm vs. 50 ppm
- Re-bound
- Corrosion

Chlorine Dio

not effective in Hot H_2O
ClO_2 gases off shortly
Sick reactor will d

Mono CL

~~Excess~~ good alternative to ClO_2
1.5 – 2.0 ppm - loss by mod
- ozone
- use in hot water

Copper – Silver ION. cells

Cu .2 – .8 ppm
Ag .01 – 0.05 ppm

POU Filtration for high risk

.2 micron filters
have extended use filter
tested 4 weeks
~~* filter installed upto 12 weeks~~

Single collection?

volume → 250mL / previously 100mL

Flush / No Flush? → No flush

1st draw 95%

2nd flush 60%

if sampling pipes

Collect sample then water

— transit time — within 48hrs

LAB Testing — colonies / culture

COC → does not rule genetic probes or false positives ← PCR based assays for L detection

* Acceptable rate of L
  - AL, Goals, Zero ness?

MCL & MCLg

Zero goal but not necessary to avoid outbreaks

5% specificity of L → ½ in disease

Since flavor diff color in UV light
L— Mediadia - disease causing
L— Pneumophila - is main disease
causing group

Future of Monitoring _ Micro in
Skunkheads

- Q/A 2nd door CL2
Add disinfectant to Hot water
- THM test → No
- PB/Cu
- Best free disinfectant for Hosp - Depends
-
MCL thoughts?

JH 3/12/15

Toll Free
Fax 858-5827
735 9422

Fax (510) 735 9421 (Fax WS)

First Victory w. Steve Mon 7/6

Donna DeBruyn, Bed exp.
Mark Oosel, w. Tom Henry

Legendle — H-kraft contacted
— got RFIA — will do w/s

Some Js on O.m's request, city taken
off O.m's Email
City's make a good-faith effort
Legendle — DCH getting wrecked
w. LHD → continues to look to
conclusion of last quarter supply ; contrib.

Long growth range Tract 95-115

.5 - 20 mg/L
Ozonation
RO Office
Specific (Domestic)

each
Calculator NOW — alternatives

Contact me next?

① • Ozone — key op.
• Nos — data trending
② • Cl residual (.5 - 2.0) — continuous goal
③ • pH — (6.2 - 7.8) range to maintain
④ ⑤ Flushing — rigging offset of at least
Flush out (New) before it gets warm
⑤ ⑥ Monitoring — Sq. Ft. for Legionella
Private Lab — near specified LABS
(TAP — DOH
Post mist (0-2 fm when)
• Standard methods

Doctor w/ Flint & get em on path to race the problem & Go reactive

CITY OF FLINT

Dayne Walling
Mayor

January 18, 2015

The Honorable Rick Snyder
Governor, State of Michigan
P.O. Box 30013
Lansing, MI 48909

RE: Flint Water Improvement Plan

Dear Governor Snyder:

On behalf of the Flint community, I am writing to convey serious concerns about water quality and to request your support for my proposed Flint Water Improvement Plan. Access to safe and clean water is a basic human right, and, therefore, policy and budget decisions need to ensure that water is affordable and secure for everyone in Flint and all across Michigan It is essential there is City, State and Federal cooperation to address the challenges here and to meet the needs of vulnerable populations.

The Flint Water Improvement Plan is focused in five areas: safety, quality, access, investment and education. The plan puts safety and quality first because this is fundamental. It is designed to be a sustainable solution for the City of Flint and the community as we move towards a new permanent water supply from Lake Huron through the Karegnondi Water Authority. My plan offers new ideas and also builds on successful models of utility, energy and assistance programs at the State and Federal levels.

Safety & Quality

- 100% Safety is the standard
- City of Flint reports testing data to the public to assure safety and expands testing sites and frequency
- Bring on experienced river water treatment operational management in the City of Flint

Access

- Announce an amnesty program for Flint water service turn-ons and reduce the turn-on fee
- Develop a revised affordable payment plan policy to encourage customers to return
- Design Federal and State partnership to establish new Drinking Water Emergency Assistance Fund for the elderly and vulnerable families

Investment

- Accelerate water system improvements outlined in the City of Flint Capital Improvement Plan through Federal and State Investments
    - State approves City of Flint's Distressed Cities Fund applications

- Federal and State support for replacement or forgiveness of payment to the Drinking Water Revolving Loan Fund due to Flint's status as a distressed community
- Federal and State grants for infrastructure improvements in alignment with the Flint Master Plan

- City Water Department implements budgeted FY15 projects including leak detection, valve repairs, new pipes and meter replacements

Education

- Develop a community partnership with universities to provide household and business customers with information on testing and conservation
- Ongoing partnership with Michigan Department of Human Services, United Way, Salvation Army and community organizations to provide information and water assistance with the Keep the Water Flowing Fund and support services
- Expand youth energy initiative to assist households with conservation and efficiency (piloted in summer 2014 with Northwestern High School students, EcoWorks and Consumers Energy)

It is also critical to restore the public confidence in Flint Water. The implementation of this plan must be accompanied by extensive community engagement including local elected officials. My objective is to work with you and your appointed officials, State Senator Ananich, State Representatives Phelps and Neeley, Congressman Kildee, community groups, businesses, churches, foundations, the Flint City Council, and all of the City of Flint and government personnel.

It is imperative that we communicate better and provide residents more information. I understand representatives from the Michigan Department of Environmental Quality will be joining a public forum this week at City Hall. This engagement going forward is vital so thank you for supporting their efforts. I think this issue of transparency is important for communities all across the State. I recommend a review of the applicable laws and policies and, at a minimum, a new requirement that water testing data be reported publicly no less than quarterly by law in all Michigan communities in Flint's population category.

Thank you for the consideration Governor. There is nothing more important in Flint right now than fixing the water problems. We must work together to identify funds to repair and update the water treatment facilities and city-wide infrastructure and to help those persons without access to clean water so that the entire Flint community has sustainable, safe, secure and affordable water now and into the future. This is an important issue for the state of our State of Michigan and I urge you to work with us to implement solutions.

Sincerely,

Dayne Walling, Mayor
City of Flint

CC: Flint City Council President Joshua Freeman; Congressman Dan Kildee; State Senator Jim Ananich; State Representative Sheldon Neeley; State Representative Phil Phelps; Flint Emergency Manager Jerry Ambrose

89 (Rev. 02-11)

STATE OF MICHIGAN
DEPARTMENT OF TREASURY
LANSING

RICK SNYDER
GOVERNOR

ANDY DILLON
STATE TREASURER

Mr. Edward Kurtz
Emergency Manager
City of Flint
1101 South Saginaw Street
Flint, MI 48502

April 11, 2013

Dear Mr. Kurtz:

Thank you for your March 29, 2013 letter, which is attached for reference. As the Emergency Manager for the City of Flint ("Flint" or "City"), you have asked for my concurrence, pursuant to Public Act 436 of 2012, the Local Financial Stability and Choice Act, to authorize a contract in excess of $50,000.00 not subject to competitive bidding. This request was related to the City entering into an agreement with the Karegnondi Water Authority (KWA) for provision of raw water for the City.

In considering your request, I took note of the following facts in support of Flint joining KWA. First, there is widespread support in the City for this move, including the support of the Mayor, the City Council, and the Emergency Manager. Second, this move will provide a unique opportunity for the City and County to partner on an important project, which will hopefully lead to future regional collaboration. Third, the Department of Environmental Quality is supportive of the City participating in the KWA project. Finally, your representations that this deal will lead to substantial savings for the City over the coming decades, savings that are desperately needed to help with the turnaround of the City of Flint.

It is my understanding that the Detroit Water and Sewer Department is making a final best offer to Genesee County and the City of Flint next Monday, April 15, 2013. As such, this approval will be effective at 5 pm on April 16, 2013 after receiving written notice from the City that either no such offer was presented to the county and the City or that an offer was received and was rejected in good faith based upon specified objections.

For the reasons described above and subject to the conditions set forth herein, pursuant to Section 12 (3) of PA 436 of 2012, I am authorizing you to proceed with adopting the resolution and entering into a contract with KWA.

Sincerely,

Andy Dillon
State Treasurer

DCH Follow-up

Shannon Johnson — Jim Henry

contact to Eaton — refer to SCHD or DCH or BRA

working on agreement — will schedule next trip to ANN ARBOR

Need map w-SOF. detail — to city streets to overlay WRT dist-system

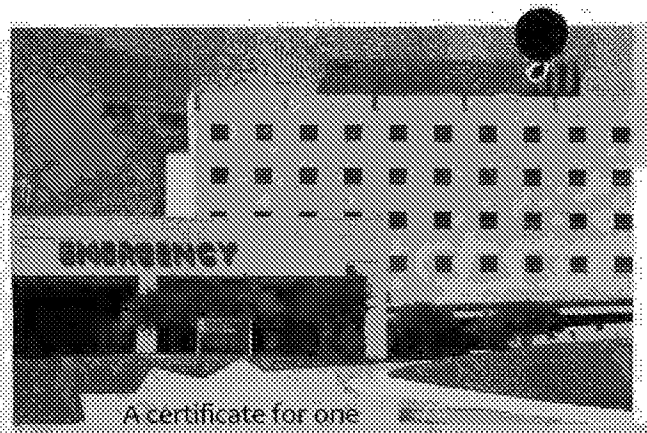
Bridgewater — Nelson

— McClain Hwy Jerry Fall-time contract ∴ Paws

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
RECEIVED 15101 MAR 30 2015
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MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
RECEIVED 15101 MAR 30 2015
EXAMINED AND APPROVED FOR COMPLIANCE WITH ACT 399, P.A. 1976

Christina / New Pgm Mgr Hall

10
730



EPA's Office of Research and Development (ORD) and Office of Water invite you to a **free webinar**

EPA

Understanding End Water Quality in Hospitals and Other Large Buildings

A certificate for one continuing education contact hour will be offered for this webinar

Tuesday, April 28, 2015
2:00 to 3:00 pm EST

Use and effectiveness of various available technologies for the treatment and control of *Legionella*

The presentation will provide a brief overview on the EPA draft document "*Legionella*: Current Knowledge on Treatment Technologies" which will characterize the current body of knowledge regarding the use and effectiveness of various available technologies for the treatment and control of *Legionella*. The document will provide an overview on *Legionella*'s microbial, epidemiological and other characteristics as well as describe various control approaches for the prevention and remediation of *Legionella*. The information on treatment technologies will include a characterization of their effectiveness, water quality issues and recommended operational conditions based on the reviewed literature. The document could assist primacy agencies, affected facilities and system operators in their decision-making process regarding measures to control for *Legionella* in building water systems.

Presented by César Cordero – *EPA's Office of Water.* César joined the Standards and Risk Reduction Branch (SRRB) of the EPA Office of Ground Water and Drinking Water (OGWDW) in 2007. During his time in SRRB he has been involved in the review of the Revised Total Coliform Rule and the Long Term 2 Enhanced Surface Water Treatment Rule. He has also been involved in the development of the Contaminant Candidate Lists as well as helping address issues related to emerging waterborne pathogens. César has a B.S. in Industrial Microbiology and an M.S. in Biology, both from the University of Puerto Rico-Mayaguez.

Water quality issues in large buildings and emerging treatment technologies for premise plumbing-related pathogens

The Safe Drinking Water Act (SDWA) sets limits on water quality indicators for water in the distribution system. Once this distributed water enters a building or household, the responsibility of maintaining water quality shifts to the owners. The latest data for waterborne diseases indicates that premise plumbing-related outbreaks are increasing across the U.S. This fact, and the legal ramifications of waterborne outbreaks, are leading hospital and hotel owners to address water quality in their buildings. This presentation will discuss ORD's investigation of water quality issues in large buildings, with the goal of providing information to building owners on how water quality changes as it moves through complex premise plumbing systems. The evaluation of emerging treatment technologies designed specifically to control premise plumbing-related microbial pathogens will also be discussed.

Presented by Mark Rodgers, Ph.D. – *EPA's Office of Research and Development.* Mark Rodgers is the Chief of the Microbial Contaminants Control Branch, in the EPA National Risk Management Research Laboratory. In this role he supervises microbiologists working on a diverse research program that includes the development of assays for determining sources of fecal contamination in source waters, the community composition of biofilms in drinking water distribution systems, the fate of pathogenic and indicator organisms in biosolids and the effectiveness of various conventional and emerging drinking water disinfectants.

Webinar Registration: https://attendee.gotowebinar.com/register/2867776279925225729

Who should attend?

State primacy agencies, tribes, community planners, technical assistance providers, academia and water systems interested in issues facing community water systems and solutions to help solve them.

In 2015, EPA's Office of Research and Development and Office of Water will host monthly webinars to discuss challenges and treatment solutions for small drinking water and wastewater systems.



EPA 2015 Monthly Webinar Series: Challenges and Treatment Solutions for Small Drinking Water and Wastewater Systems

All webinars will take place from 2:00 to 3:00 pm EST

January 27	Arsenic Treatment Technologies (COMPLETE)
February 24	Innovative Biological Treatment for Small Water Systems: Ammonia, Nitrites, and Nitrates (COMPLETE)
March 31	Small Water System Alternatives: Media and Membrane Filtration for Small Communities and Households (COMPLETE)
April 28	Understanding End Water Quality in Hospitals and Other Large Buildings
May 26	Current Water Treatment and Distribution System Optimization for Cyanotoxins
June 30	Biological and Microbial Aspects of Septic System Pollution
July 28	Corrosion Control for Drinking Water Systems
August 25	Distribution Operation Options for Small Systems to Address DBPs
September 29	UV Disinfections Systems – Treatment of Groundwater for Small/ Medium Sized Water Utilities
October 27	Decentralized High-Rate Wastewater Treatment of Peak Wet Weather Flows
November 24	Treatability Databases, Cost Models, and Other Tools for Water Systems
December 15	Reduction of Lead in Drinking Water

NEW!

Webinar recordings available on ASDWA's website:
http://www.asdwa.org/index.cfm?fuseaction=Page.viewPage&pageId=509&parentID=503&nodeID=1
(Certificates of completion cannot be given for viewing webinar recordings.)

Webinar — WQ in Hospitals

4/28/15

Cesar Candelo

Current treatment techs for L

EPA → drafted doc / Rs WRT efficiency of treatment
EWQ imposes

EPA, CDC, ASDWA → meth. agency guidance

L. Background
- > 50 species
- occ. dist system / Memoir Rating
- colonize in biofilms
- Ability to persist ec natural / tolerate warm temps

Made from
- shower heads, faucets, hot tubs
- mist machines, cooling towers
- Resp. therapy devices / humidifiers

• Multi barrier app to control L growth

Cl2 — wide range of dose & WQ conds
- need residual, ↑ kill w ↑ temp
- Biofilm shield L
- TTHM, HAAs, TBO issues

- Mono Cl_2
  wide range of pH not / very by pH
  ↑ kill w. ↑ temp
  Better kill w. Biofilms
  not the same as / with Cl, core

- Cl Dioxide
  < 1 mg/L ↓ to low doc
  Less stable Biofilm
  Surface ppt, ↑ kill - ↑ temp
  - chlorite, chlorate, org, TTO

- Copper-Silver Ionz
  - ↑ E - 0.1 mg/L ✓ with belgOL
  Copper ions & ions
  Broader stroke
  L resistance to cu & silver
  Cu/Si ions

- UV — 40 mJ/cm² ✓ vs. L
  — no residual
  — use ✓ UV lamp output
  UV reactors not tolerant by ↓ temps/chem comps.

- POU filtration — WSP
  ≤ 0.2 µM
  clogging potential

Preventative/Remediation Strategies

- Energy disinfection
  - superheat/flush/disinfect
    - 71-77°C outlet flush 30 MIN
  - Re-grout by concern
- Shock Hyper Cl 20-50 ppm
  - mix 9 months
  - L h. dos in amoeba

Bldg Treatment & Reg oversight

- V- with Primary agency / EPA Reg office
- http://www2.epa.gov/sites/production/files/2014-10/documents/vsl-tg-ch2-office

RUL draft doc → summer 2015 & RUL input obtained focus doc L-54-2015
RUL Final doc → FALL 2015

MARK Rogers — Office of Research & Development

Biofilm
Mycobacterium, L can grow in dist. conv.

L can survive inside acanthamoeba
& inside amebas

Energy Bldg a a deadend — Plumbing type/config.
— Stagnation

EPA Regs → PWS 15 conn/25 ppl > 60 day
Comm/non comm

most conns not PWS
unless add treatment is provided

- Primary treatment options → See earlier
what constitutes treatment not always well defined

ionz Filtration cu/silver dep on water chem

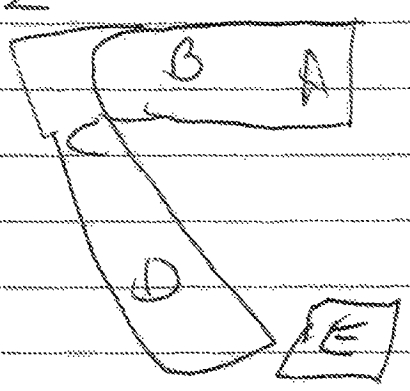
effectiveness? =
- who's right? — Bldgs / Floors / outlets
- type of study — Both sides vs. outcome
- what to monitor → control measures?
- Best methods to detect presence of pathogen

Ch cost for MCL reduction

— See Hosp #1 sampling Plan — identified trap tracks
Fac Ch
Copper/silver levels

Bact Mon./culture methods & molecular methods
Live growth parts detected

— See Hosp #2



Floors 1-8
sampling Plans
Bldgs A, B
& wards
Fac Ch levels
Ranges
Hot locs

Temp Range in Both Bldgs

↳ Pneumatic results 9/20 surface

Monitored Loss on all parts of bldg

One Bench study of cy/silver Based hyp. H2O

- Prop seal plan
  - Foam
  - Underwood water prog
  - EO plan
  - EO How to control
  - How monitored
  - How to record effectiveness

4/14/15 DEQ - DHS Internal Mtg

Wanted to hear more system anomalies around McClaren?

Dates to flow in - on?

On OW side - Bacteria clean PTAP
Cl2 - lowest .8 PTAP
Turbs -

Mono TOC on Flint River which can serve as substrate for growth - BG/L

Hydrant should have their own risk assess & Prog in place -

McClaren → hypo chlor → our understanding → Cont feed?
* go & see their op plan/control pts *
* to verify that they are following protocol *

* (how can track & history of dist. system repairs - work orders)
if/when invoices are completed / we have no regulatory authority on private bldgs *

* customer replacement of PB Line for customer

Moving forward - contact Hosp. → see their risk assess & protocols

Plan c: 4/09 Mtg @ McClain/Hurley Hosp:

Hurley — Ann Newan

McClain

lot city knows whats going on - Jurisdictional Banks

- Howard — see who plumbing dec control is

— lot em knows Hurley/McClain old treatment

• we want to meet/discuss — we will

Mickey decisions on plumbing permit/Potential

we may have to tap the boys standpipe site

& put in so plumbing

City's Main contractor

Waldorf

McFee/Stacer

B.W. Longo →

from Treasury

and got approval to sole source LAN for GAC

EPA off. of Research & Dev.

Help on Sol Mod/Dist Mod

Darren Lytle — 513 569-7932

Lytle.Darren@EPA.gov.

Chris Dorsey

Storage tank safety

- Overpressure - DOT Tanks - water chem

Prysby, Mike (DEQ)

From: Bloemker, Jon (DEQ)

Sent: Thursday, September 22, 2011 8:43 AM

To: Shekter Smith, Liane (DEQ); Joseph, Mark (DEQ); Verona, Laura (DEQ)

Cc: Lee, Lonnie (DEQ); Browne, Elizabeth (DEQ); Hoffman, Kelly (DEQ); Willard, Veronica (DEQ); Ashford, Stephen (DEQ); Prysby, Mike (DEQ)

Subject: RE: Genesee County - Proposal for regional system

In the original meetings, we agreed that the Saginaw Bay District would review the plans for the intake, raw water pump station and the transmission line through Sanilac County. The Lansing District was responsible for the raw water transmission line through Lapeer and Genesee Counties plus the treatment plant located in Genesee County. John O'Brien et al, from Genesee County Drain Commission, participated in these meetings.

We have all ready reviewed portions of the draft feasibility study and conceptional plans.

From: Shekter Smith, Liane (DEQ)
Sent: Wednesday, September 21, 2011 5:22 PM
To: Joseph, Mark (DEQ); Bloemker, Jon (DEQ); Verona, Laura (DEQ)
Cc: Lee, Lonnie (DEQ); Browne, Elizabeth (DEQ); Hoffman, Kelly (DEQ); Willard, Veronica (DEQ)
Subject: Genesee County - Proposal for regional system

Just wanted to follow-up a meeting we (Sonya Butler, Kelly Hoffman, and I) sat in on last week with Genesee County to discuss the new water authority and their plans for a regional system with Lapeer County, Sanilac County, the city of Lapeer, and the city of Flint.

In general, they took the opportunity to describe for us their master plan. We discussed options for revolving loan dollars. In addition, they asked if we (the community water supply program) could coordinate the reviews for permitting that would be needed in light of the fact that the project will be crossing district boundaries.

I think it will be helpful if we could discuss via a conference call. Since everyone was out last week at the Section meeting, I haven't had a chance to coordinate the conversation yet. Thought I'd share this note to get you thinking about issues you might see on the horizon.

Laura – I've included you since the Detroit system is obviously impacted by any proposal that is being discussed. They indicated in the meeting that they had reached an agreement (or at least a meeting of the minds) with the city of Detroit regarding a couple of options available to them relative to proceeding with the proposal. Perhaps you've heard something from the city that might shed some more light on this.

Veronica could you please set up a call for us. Friday morning looks good for me. It might have to wait until next week depending on calendars.

Kelly – would it be helpful for you to participate in the call in order to hear the discussion from the program side? They may also have questions for you.

E. 1.4 Mg — Own Wealth

Bigger Issue — Flint has city on water
— Still a conn. to DWSD

Now — top the std → ON within 30 days

Extent of PN — PAS regr to conn. customers

Outreach to local NGR, Residents, Community Leaders

(→ not new
but now → when c. is HR
want to know if Gov. it

Evade (if PN now) → Reconfigure Water/Sewer Neglected —

Do we drink the water?
Is it safe to drink

Take Long-term risk against rate increase
Permanent for customers

Re-group Geo any trigger was now right

- Bay City
- Flint
- Grand Rapids
- Jackson
- Kalamazoo
- Lansing
- Muskegon
- Saginaw
- All Michigan

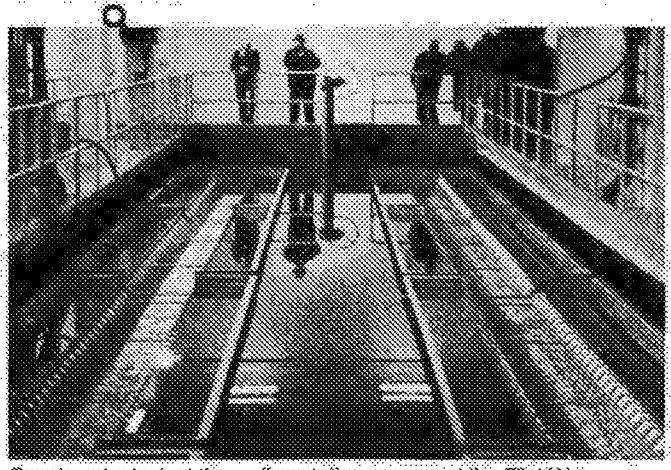
Flint City Council delays decision on joini Huron water pipeline

(http://connect.mlive.com/user/GaryRidley/index.html)By Gary Ridley | gridley@mlive.com
(http://connect.mlive.com/user/GaryRidley/posts.html)
on March 11, 2013 at 7:12 PM, updated March 11, 2013 at 10:12 PM
Print (http://blog.mlive.com/flint_impact/print.html?entry=/2013/03/flint_city_council_delays_deci.html)

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Sign in

FLINT, MI -- The Flint City Council declined to take action on whether the city should participate in the construction of a multi-county pipeline that would bring drinking water to the city from Lake Huron.



Guests get a look at the sedimentation process at the Flint Water Treatment Plant during a tour of the plant as a way to educate the public on the process of the water treatment. The plant is run four times a year to make sure it's working correctly. The plant would filter Lake

File Photo

Council members voted 6-3 Monday, March 11, to delay the decision on joining the **Karegnondi Water Authority (http://www.mlive.com/news/flint/index.ssf/2010/10/karegnondi_water_authority_set.html** which would pull water from Lake Huron and replace the city's reliance on Detroit for water.

Council members Dale Weighill and Joshua Freeman, as well as council President Scott Kincaid, voted against the delay. Kincaid cited the possibility of a new emergency financial manager being appointed by Gov. Rick Snyder in Detroit later this week as a reason why the council should make the decision

Currently, the city obtains its drinking water from the Detroit-operated water system but rising costs have left the city seeking new sources.

Flint emergency financial manager Ed Kurtz has **still not recommended (http://www.mlive.com/news/flint/index.ssf/2013/01/future_flint_water_rates_still.html)** to the state whether the city would join the authority.

However, Mayor Dayne Walling said the council has the authority to make the decision on joining the authority after voters repealed the previous emergency manager law in 2012.

- Bay City
- Detroit
- Flint
- Grand Rapids
- Jackson
- Kalamazoo
- Lansing
- Muskegon
- Saginaw
- All Michigan

Walling said the needed to make a decision on joining the authority before the state makes a decision on the city's behalf and a revamped emergency manager law goes into effect at the end of the month.

"We've determined there was a window of opportunity here for this body to take its rightful role ...," said Walling. "It's likely we could wake up tomorrow and the state could take us in a different approach."

City attorney Pete Bade said that he believes Kurtz would retain the final decision on the future of the city's drinking water but added that a council decision could still be influential in the process.

Sign in

"I wouldn't look at the resolution as a shallow piece of paper," said Bade.

Kurtz could decide to go along with the council's decision or veto it and institute his own plan.

The Karegnondi proposal calls for the city to purchase 18 million gallons of untreated Lake Huron water daily through the pipeline. The water would be treated at the city's treatment plant and then distributed to Flint customers.

Genesee County Drain Commissioner Jeff Wright, who addressed the council Monday night, said the city would pay roughly $6.4 million annually for water service if it joined the pipeline -- a nearly $4 million savings on what it pays Detroit for water.

Wright said the rate would be fixed over a 25-year period, whereas what Detroit charges is likely to continue increasing.

However, some council members were concerned about why the proposal was just now being brought in front of the council when voters elected to repeal the previous emergency manager law months ago.

"I want to do what's best for the city of Flint," said Councilman Bernard Lawler, who voted to delay the decision.

Lawler said that he wasn't even given a weekend's notification to evaluate the proposal.

Councilman Sheldon Neeley, who also voted to delay the decision, agreed with Lawler and asked that the council have more time to evaluate the information.

But Wright cautioned the city against waiting too long. The drain commissioner said work is **slated to begin (http://www.mlive.com/news/flint/index.ssf/2012/10/construction_permit_approved_s.html** on the pipeline with or without Flint and if the city waits too long to join it could force costly redesigns.

- Bay City
- Detroit
- Flint
- Grand Rapids
- Jackson
- Kalamazoo
- Lansing
- Muskegon
- Saginaw
- All Michigan

Search

Sign In

Wright said that a week delay should not affect Flint's costs but further delay could, as the construction season will soon be getting underway.

County commissioners have also **expressed their displeasure (http://www.mlive.com/news/flint/index.ssf/2013/02/genesee_county_commissioners_t_10.** with Flint over its pipeline decision.

The city, if it agrees to join the authority, would still rely on Detroit water for the roughly three years it will take to build the pipeline.

Flint finance director Jerry Ambrose said the city would likely experience a $20 million savings by 2020 if it joined the authority.

But Ambrose said it isn't clear if the savings would translate to lower rater rates or just slow down rate increases.

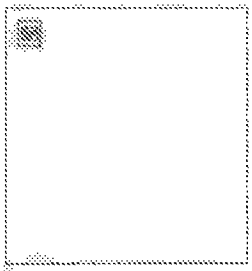
The city has raised its average water and sewer rates more than 110 percent since January 2011. City officials said the increases are due to rising legacy costs, population loss, rate increases from Detroit Water and Sewerage and maintenance of an aging system.

"It's not realistic to say, based on this, that we'll see a reduction in rates," said Ambrose.

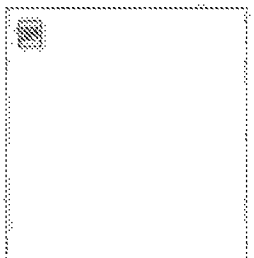
The council is now scheduled to vote on the proposal March 18.

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(http://www.mlive.com/news/flint/inde -flint_p_13.html) University of Michigan -Flint, Mt. Morris schools team up for early learning teacher training program (http://www.mlive.com/news/flint/inde -flint_p_13.html)



(http://www.mlive.com/opinion/flint/in Letter links: Letters to the editor from the week of March 10 (http://www.mlive.com/opinion/flint/in

11/1/12
from
GCDC

Detail of Worse Case Cost Projections

Worse Case Scenerio

Cost Comparisons: Water Supply to City of Flint from DWSD and proposed KWA project

Cost of Water to City of Flint (excluding Genesee) using continued service from DWSD

	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
Fixed Cost (1)	$ 4,411,680	$ 4,852,848	$ 5,338,133	$ 5,871,946	$ 6,459,141	$ 7,105,055	$ 7,815,560	$ 8,597,116
Escalator	1.1	1.10	1.10	1.10	1.10	1.10	1.10	
Commodity Cost (2)	$ 7,276,640	$ 7,640,472	$ 8,022,496	$ 8,423,620	$ 8,844,801	$ 9,287,041	$ 9,751,394	$ 10,238,963
Escalator	1.05	1.05	1.05	1.05	1.05	1.05	1.05	
Flint WTP Operating Cost (3)	$ 2,725,538	$ 2,861,815	$ 3,004,906	$ 3,155,151	$ 3,312,908	$ 3,478,554	$ 3,652,482	$ 3,835,106
Escalator	1.05	1.05	1.05	1.05	1.05	1.05	1.05	
TOTAL	$14,413,858	$ 15,355,135	$16,365,534	$17,450,717	$ 18,616,851	$19,870,650	$ 21,219,436	$ 22,671,185

(1) Per FY13 Budget and DWSD Contract, fixed charge from DWSD for FY13 is $707,000 per month or $8.5 million total. Flint's cost is 52% or $4.4 million total.

(2) Per FY13 Budget and DWSD Contract, and based on 12 million gallons per day (mgd), cost is $7.3 million, based on $12.46/unit ($12.46x1600unitsx365).

(3) Per FY13 Budget, annual cost of WTP is $4.1 million. Genesee County pays $1,386,000 for emergency back up service.

Cost of Water to City of Flint using proposed KWA project for water supply to Flint WTP

	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20
KWA Entry Costs (1)	$ 581,400	$ 581,400	$ 581,400	$ -	$ -	$ -	$ -	$ -
Fixed KWA Construction Cost (2)				$ 7,582,128	$ 7,582,128	$ 7,582,128	$ 7,582,128	$ 7,582,128
Escalator						1.00	1.00	
Fixed Flint WTP Construction Cost (3)				$ 556,651	$ 556,651	$ 556,651	$ 556,651	$ 556,651
Escalator								
Flint WTP Operating Cost (4)	$ 5,911,538	$ 6,207,115	$ 6,517,471	$ 6,843,344	$ 7,185,511	$ 7,544,787	$ 7,922,026	$ 8,318,128
Escalator	1.05	1.05	1.05	1.05	1.05	1.05	1.05	
KWA Commodity Charge (5)	$ 759,200	$ 797,160	$ 837,018	$ 878,869	$ 922,812	$ 968,953	$ 1,017,401	$ 1,068,271
Escalator	1.05	1.05	1.05	1.05	1.05	1.05	1.05	
TOTAL	KWA NOT AVAILABLE				$ 16,247,103	$16,652,519	$ 17,078,206	$ 17,525,177

(1) The City will, upon joining, be required to pay a fee of $32,300 per MGD for each year until bonding for the project is obtained. At 18MGD, the City's cost is $581,000 annually. It is projected that fee will be assessed for 3 years.

(2) Per KWA proposal, project cost is $272 million. City's fixed cost would be 30% of debt service, based on capacity design of 60mgd, of which 18MGD is for Flint. Debt service is based on 5% interest rate @ 25 years; 5% added to principal for capitalized interest for FY13, FY14, and FY15. ($272,421,588 plus $13,621,078 for 3 years = $313,284,792). **The costs here are increased by 15%; debt service starts in FY16 but water is not available until FY17.**

(3) Per KWA proposal, the cost of upgrading the Flint is $6 million. City's fixed cost would be100% of debt service based on 5% interest rate @ 25 years), with 5% added to cover capitalized interest for FY13, FY14, and FY15, (total principal = $6.9 million). **Again. costs here are increased by 15%; debt service starts in FY16 but water is not available until FY17.**

(4) Per FY13 Budget annual cost of WTP is $4,111,538. $1.6 million for electricity and chemicals & 2 FTE's are added. 100%

(5) Per KWA proposal, initial commodity charge would be based on $1.30/unit or 7,500 gallons. Charge is based on 12MGD.

11/1/12

WORSE CASE SCENARIO
SUMMARY COMPARISON: KWA V DWSD
(15% Cost Overrun; One year delay in Water Supply delivery)

Water and Sewer Cash Flow with KWA

	Year 1 FY13	Year 2 FY14	Year 3 FY15	Year 4 FY16	Year 5 FY17	Year 6 FY18	Year 7 FY19	Year 8 FY20
Current DWSD & FWTP Costs	$14,413,858	$ 15,355,135	$16,365,534	$17,450,717	$ -	$ -	$ -	$ -
KWA Entry Fee	$ 581,400	$ 581,400	$ 581,400	$ -	$ -	$ -	$ -	$ -
KWA Debt	$ -	$ -	$ -	$ 7,582,128	$ 7,582,128	$ 7,582,128	$ 7,582,128	$ 7,582,128
FWTP Debt	$ -	$ -	$ -	$ 556,651	$ 556,651	$ 556,651	$ 556,651	$ 556,651
KWA operations	$ -	$ -	$ -	$ -	$ 922,812	$ 968,953	$ 1,017,401	$ 1,068,271
FWTP operations w KWA	$ -	$ -	$ -	$ -	$ 7,185,511	$ 7,544,787	$ 7,922,026	$ 8,318,128
TOTAL COSTS	$14,995,258	$ 15,936,535	$16,946,934	$25,589,496	$ 16,247,103	$16,652,519	$ 17,078,206	$ 17,525,177

Water and Sewer Cash Flow with DWSD

	Year 1 FY13	Year 2 FY14	Year 3 FY15	Year 4 FY16	Year 5 FY17	Year 6 FY18	Year 7 FY19	Year 8 FY20
Current DWSD & FWTP Costs	$14,413,858	$ 15,355,135	$16,365,534	$17,450,717	$ 18,616,851	$19,870,650	$ 21,219,435	$ 22,671,185

Cash Flow Difference: KWA and DWSD

	Year 1 FY13	Year 2 FY14	Year 3 FY15	Year 4 FY16	Year 5 FY17	Year 6 FY18	Year 7 FY19	Year 8 FY20
Annual KWA - DWSD	$ (581,400)	$ (581,400)	$ (581,400)	$ (8,138,779)	$ 2,369,748	$ 3,218,131	$ 4,141,229	$ 5,146,008
Cumulative	$ (581,400)	$ (1,162,800)	$ (1,744,200)	$ (9,882,979)	$ (7,513,231)	$ (4,295,100)	$ (153,871)	$ 4,992,137

"Worse Case" scenario differs from Original in these respects:

Delivery of water to Flint from KWA is delayed by one year and construction costs are 15% above the origin projection.

(1) Consequently, the City is required to begin paying for debt service one year before KWA begins delivery of water. This is in addition to its obligation to pay its entry fee of $581,000 annually for the first 3 years.

(2) Considering $9.8 million in upfront costs in the first 4 years prior to KWA operation, the cost of KWA exceeds the cost of DWSD until year 8. Once KWA begins delivering water in year 5, annual operating costs are less than DWSD by 13%

(3) Cumulative savings by Year 8 are projected to be $5 million, compared to $24 million in the Original projection.

Prysby, Mike (DEQ)

From: Bloemker, Jon (DEQ)
Sent: Tuesday, June 19, 2012 11:17 AM
To: Lee, Lonnie (DEQ)
Cc: Ashford, Stephen (DEQ); Prysby, Mike (DEQ); 'jredding@rowepsc.com'; 'jcomalia@gmail.com'
Subject: Karegnodi Water Authority (Genesee County Drain Commission) Intake

Near final plans for the Karegnodi Water Authority's proposed intake will be submitted to the SBD Office within the next few days. It is our understanding that Water Resources does not have any issues with the minor changes in the intake's exact location. Also, it is our understanding that Water Resources will be placing the project out for public comment with a proposed closing date of July 18th.

Prior to the July 18th closing date, the SBD Office staff will meet with the consultants to discuss the plans. If the plans do meet the minimum requirements for the SDWA, it is my intentions to issue the construction permit immediately on the determination that the requirements have been met. The issuance of the permit under the SDWA will not obviate the necessity of the authority for obtaining any other permits or approvals.

Fri 3/20/15 399 Ridge

8:00 AM Pine Ridge MHP Visit
w. Todd Fox

DCH -
Skanna
Susan
Jax Fedick
DCH Cost Code

Rec/Bck ReRent/
Lease

If completed → DCH
7 completed - LHO
Deaths

CASO interviews

DCH/LHD/DCC Call 4/7/15

1. If completed DCH / completed LHD → Nov/Dec received CASO
   → Deaths number ?

2. Goal Date to finish (Severance/deaths)?
   28 contact Pending Getinea LHD/DCH
   Cut-off → 2 calls/2 ltrs → extend Last to follow-up
   work the goal # contact as many as possible
   CC: LTR to DCH - extend LTRs there may
   for 5 more days

4:- Data base & entering from Paper

CASES → 45 cnt (L) Pantine Face
45/EC - Cen-Co.
27 - Fnty
6 - Mtmrgr
4 - Dentum

Now

7 deaths of Legionella

2 new cases reported

new Phase - exposure?
hospital system / water

Race by % of patients with one hosp.
hypo-Cl2 & ongoing surveillance

OF cases >50% from FLINT

concern of system
w/ leaks → FOIA request
- helpful to get map of w/m breaks
- map of slow moving w/m water
- Lead/Iron Pipes

all instances of w/m breaks
& flushing / w/m / to associate
onset of outbreaks

Should I focus
the city on providing
the most bang for the buck?

Is the city now sampling
plant tap?

other Requests for DCH

- ETA, COC
- what kind surveillance? ATOVR? Applicable to COC
- timeline? Public info - story?
  if drugs → locally drugs
- Environmental testing protocol (info)

Prysby, Mike (DEQ)

From: Busch, Stephen (DEQ)
Sent: Tuesday, April 07, 2015 12:10 PM
To: Henry, James
Cc: Prysby, Mike (DEQ); Benzie, Richard (DEQ); Shekter Smith, Liane (DEQ)
Subject: RE: Legionella Conference Call w/ MDCH

I am out of the office on Sick Leave today.

Mike Prysby will try to call in.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

From: Henry, James [mailto:jhenry@gchd.us]
Sent: Tuesday, April 07, 2015 12:06 PM
To: Busch, Stephen (DEQ)
Cc: Prysby, Mike (DEQ)
Subject: Legionella Conference Call w/ MDCH

Hello Mr. Busch,

If possible would you or a representative from your office please attend the conference call that is being hosted by MDCH regarding the Legionella cases in Genesee County. Your knowledge and experiences may help us better understand the Flint municipal water system and municipal water in general, relative to Legionella. I understand that this is short notice, the meeting is today at 2:30pm and the call line is below.

PPI
Access code: PPI

Thank you
Jim

Jim Henry RS, MBA
Environmental Health Supervisor
Genesee County Health Department www.gchd.us
630 S. Saginaw St., Suite 4
Flint, MI 48502-1540
Phone (810) 257-3618 Fax (810) 257-3125
E-mail jhenry@gchd.us

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From: Hasan, Shurooq
Sent: Tuesday, April 7, 2015 10:25 AM
To: Henry, James
Subject: FW: Conference call line

From: Johnson, Shannon (DCH) [mailto:JohnsonS61@michigan.gov]
Sent: Monday, April 06, 2015 8:40 AM
To: Hasan, Shurooq
Subject: Conference call line

Hi Shurooq,

The conference call line for tomorrow's call from 2:30-3:30pm is:

PPI
Access code: PPI

Thanks,
Shannon

Shannon Andrews Johnson, MPH
Infectious Disease Epidemiologist
Michigan Dept. of Community Health
201 Townsend St., CVB 5th Floor
Lansing, MI 48913
Phone: 517-335-8165
Fax: 517-335-8263

Genesee County Health Department

Mark Valacak, M.P.H., Health Officer
Gary K. Johnson, M.D., M.P.H., Medical Director

April 2, 2015

FOIA Coordinator, City of Flint
1101 S. Saginaw Street, 3rd floor
Flint, MI 48502

RE: Flint Municipal Water Information Request

Dear FOIA Coordinator,

Under provisions of the Michigan Freedom of Information Act (MCLA 15.231 et seq; MSA 4.1801 (1) et seq) please provide the following:

Please provide the dates and specific locations of the water main breaks for 2014. Please provide an electronic version with the address data file, if possible.

Please provide dates and specific locations of flushing activities within a mile radius around McLaren Hospital, Flint for 2014

Please provide a copy of the Veolia presentation that was displayed at the Technical Advisory Committee on March 4, 2015. If possible please provide an electronic version.

Please provide the monitoring locations and results for heterotrophic bacteria for 2013 through 2014.

If you determine that any of the requested information is exempt from disclosure, please detail what is being withheld and cite the exemption under FOIA. I anticipate the request being filled within five working days of receipt of this letter, as provided under FOIA. Please contact me at (810) 257-3618 if there are fees associated to comply with this request.

Sincerely,

Jim Henry
Environmental Health Supervisor
Genesee County Health Department
630 S. Saginaw Street
Flint, MI 48502

cc: Crystal Olmstead, Flint City
Howard Croft, Flint City

Prysby, Mike (DEQ)

From: Howard Croft <hcroft@cityofflint.com>
Sent: Thursday, April 23, 2015 7:36 AM
To: Henry, James
Cc: Althea Jones; Prysby, Mike (DEQ); David Roth
Subject: Re: FW: FOIA Request

Jim,

I had the utilities team gather this information and I believe that the documentation was sent to the legal department. I will check today and find out the status of the information and get you a response quickly.

On Wed, Apr 22, 2015 at 2:02 PM, Henry, James <jhenry@gchd.us> wrote:

Good afternoon,

Howard,

Would you please look into the attached request? I sent it on April 2, 2015 and haven't heard back.

Mike/Howard,

Would it be possible to arrange a meeting sometime soon, maybe the next time Mike conducts a site visit in Flint?

Robert sent
– Sent spread sht 1 on Docks
– No info on Flushing data/activities – upload if not sent

Thanks Jim

is city charging for FOIA

Jim Henry RS, MBA
Environmental Health Supervisor
Genesee County Health Department www.gchd.us
630 S. Saginaw St., Suite 4
Flint, MI 48502-1540
Phone (810) 257-3618 Fax (810) 257-3125

E-mail jhenry@gchd.us

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From: Henry, James
Sent: Thursday, April 2, 2015 4:57 PM
To: 'ajones@cityofflint.com'; 'Crystal Olmstead'; Howard Croft
Subject: FOIA Request

Good afternoon,

Please see the attached FOIA Request. Please let me know if there is confusion. I can clarify as needed.

Thanks Jim

Jim Henry RS, MBA
Environmental Health Supervisor
Genesee County Health Department www.gchd.us
630 S. Saginaw St., Suite 4
Flint, MI 48502-1540
Phone (810) 257-3618 Fax (810) 257-3125

E-mail jhenry@gchd.us

Gmail by Google

John O'Malia <jcomalia@gmail.com>

Agenda for 2/8

1 message

John O'Malia <jcomalia@gmail.com> Fri, Feb 1, 2013 at 9:51 AM
To: David Jansen <djansen@gcdcwws.com>, Steve Bush <buschs@michigan.gov>, "Prysby, Mike (DNRE)" <PRYSBYM@michigan.gov>, "Bloemker, Jon (DEQ)" <BLOEMKERJ@michigan.gov>, Elgar Brown <cbrownbear@broadstripe.net>

Gentlemen-I suggest the following agenda:
1-Introductions,
2-Discussion on bidding/bonding the intake project,
3-Present to MDEQ a final set of bid documents with Corps permit. Copy to Steve and Jon and discussion of MDEQ office design review responsibilities,
4-Current status of DWSD latest offer,
5-Current status of Flint City joining KWA,
6-Introduction of design coordination team WT etal,
7-Overview of 2009 KWA report and the current list of committed participants,
8-Timeline to award design engineering contract and entire project timeline for completion,
9-Timeline for bonding project[s],
10-Discussion of preliminary design issues and potential deviation[s] form 2009 report. Timing on final submission of design criteria and final revision of KWA 2009 report,
11-Status on use of raw water in agricultural food processing,
12-Close

Note-Lunch to be ordered in to conserve time. Expect meeting to close around 2ish?

Any questions let me know. See you on the 8th, 10:00AM GCDC offices.

John C. O'Malia, P.E.

Automatic Data Processing Inc.

STANDARD &POOR'S

S&P Global STARS Distribution

In North America: As of December 31, 2010, research analysts at Standard & Poor's Equity Research Services U.S. have recommended 35.0% of issuers with buy recommendations, 56.4% with hold recommendations and 8.6% with sell recommendations.

In Europe: As of December 31, 2010, research analysts at Standard & Poor's Equity Research Services Europe have recommended 33.6% of issuers with buy recommendations, 45.6% with hold recommendations and 20.8% with sell recommendations.

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Globally: As of December 31, 2010, research analysts at Standard & Poor's Equity Research Services globally have recommended 35.2% of issuers with buy recommendations, 54.0% with hold recommendations and 10.8% with sell recommendations.

★★★★★ **5-STARS (Strong Buy):** Total return is expected to outperform the total return of a relevant benchmark, by a wide margin over the coming 12 months, with shares rising in price on an absolute basis.

★★★★ **4-STARS (Buy):** Total return is expected to outperform the total return of a relevant benchmark over the coming 12 months, with shares rising in price on an absolute basis.

★★★ **3-STARS (Hold):** Total return is expected to closely approximate the total return of a relevant benchmark over the coming 12 months, with shares generally rising in price on an absolute basis.

★★ **2-STARS (Sell):** Total return is expected to underperform the total return of a relevant benchmark over the coming 12 months, and the share price not anticipated to show a gain.

★ **1-STARS (Strong Sell):** Total return is expected to underperform the total return of a relevant benchmark by a wide margin over the coming 12 months, with shares falling in price on an absolute basis.

Relevant Benchmarks: In North America the relevant benchmark is the S&P 500 Index, in Europe and in Asia, the relevant benchmarks are generally the S&P Europe 350 Index and the S&P Asia 50 Index.

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For residents of Malaysia - All queries in relation to this report should be referred to Alexander Chia, Desmond Ch'ng, or Ching Weh Tam.

This investment analysis was prepared from the following sources: S&P MarketScope, S&P Compustat, S&P Industry Reports, I/B/E/S International, Inc.; Standard & Poor's, 55 Water St., New York, NY 10041.

Source: S&P.

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Project 2008 Total: 11,800 LF @ $7,700,000

Project 2009: 53,500 LF @ $17,500,000

Project 2010: 5,800 LF @ $2,600,000

Transmission Main Improvements

1. 24" Steel Transmission (WTP to DuPont; south to University)
   - ~1500' of 12" $500,000.00
   - ~23,500' of 24" $9,400,000.00 – Project 2009
   - ~5800' of 30" $2,600,000.00 – Project 2010

   Sub Total : ~$12,500,000.00

2. Saginaw St (Flint River to Pierson)
   - ~6500' of 12" $2,300,000.00
   - ~9,000 of 24" $3,600,000.00 – Project 2009

   Sub Total : ~$5,900,000.00

3. Atherton (Van Slyke to Dort)
   - ~6000' of 16" $2,500,000.00
   - ~12,800 of 18" $5,000,000.00 – Project 2008

   Sub Total : ~$7,500,000.00

4. Dort Hwy. (24" Steel WTP to Hemphill)
   - ~7,000' of 18" $2,700,000.00 – Project 2008
   - ~21,000' of 24" $4,500,000.00 – Project 2009

   Sub Total : ~$7,200,000.00

SUB TOTAL TRANSMISSION MAIN IMPROVEMENTS $33,100,000.00

Pumping Station Improvements

1.	Torrey Road Booster Station	Lump Sum	$2,000,000.00
2.	Water Pumping Station No. 3 Upgrades	Lump Sum	$1,200,000.00

SUB TOTAL PUMPING STATION IMPROVEMENTS $3,200,000.00

Miscellaneous Projects

1.	City Wide Valve Replacement Project	Lump Sum	$2,000,000.00
2.	Water Treatment Plant Upgrades	Lump Sum	$25,000,000.00
3.	Water Meter Replacement (3,000/year)		$3,000,000.00

SUB TOTAL MISCELLANOUS PROJECTS $30,000,000.00

TOTAL AMOUNT OF DWRF PROJECTS $68,215,000.00

Project 2008 Total: 19,800 L.F
@ $7,700,000

Project 2009; 53,500 L.F.
@ $17,500,000

Project 2010; 5,800 L.F.
@ $2,600,000

Transmission Main Improvements

1. 24" Steel Transmission (WTP to DuPont; south to University)
   - ~1500' of 12" $500,000.00
   - ~23,500' of 24" $9,400,000.00 – Project 2009
   - ~5800' of 30" $2,600,000.00 – Project 2010

   Sub Total : ~$12,500,000.00

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   - ~6500' of 12" $2,300,000.00
   - ~9,000 of 24" $3,600,000.00 – Project 2009

   Sub Total : ~$5,900,000.00

3. Atherton (Van Slyke to Dort)
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   - ~12,800 of 18" $5,000,000.00 – Project 2008

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4. Dort Hwy. (24" Steel WTP to Hemphill)
   - ~7,000' of 18" $2,700,000.00 – Project 2008
   - ~21,000' of 24" $4,500,000.00 – Project 2009

   Sub Total : ~$7,200,000.00

SUB TOTAL TRANSMISSION MAIN IMPROVEMENTS $33,100,000.00

MEMORANDUM
TO: Liane Shekter Smith, John O'Brien, and David Jansen
FROM: John C. O'Malia, P.E.
DATE: January 3, 2012
REF: KWA Status

It was good to talk to you regarding the status of KWA at the end of the year.
I am confirming our conversations as follows.

1. Mayor Walling, the incumbent, was re-elected. He is very much in favor of the KWA project and sits as Chairman of the KWA Board.

2. The Emergency Manager [EM], Mike Brown, was appointed by Governor Snyder. EM Brown formerly served as interim mayor of the City of Flint. He has expressed support for the KWA project.

3. EM has given powers back to Mayor and Council to make the decision on KWA as a precaution if the EM court challenge holds up. This will enable the Mayor and Council to approve the KWA agreement and not be challenged in court!

4. Expect Flint to approve KWA agreement January or February of 2012.

5. Would expect a meeting with MDEQ end of January or in February.

Will keep you posted on events as they develop. Look forward to working with you and staff. Happy New Year.

ROWE PROFESSIONAL SERVICES COMPANY

Large Firm Resources. Personal Attention.

January 7, 2013

Mr. Edward Kurtz, Emergency Financial Manager
City of Flint
1101 S. Saginaw Street
Flint, MI 48502

Subject: Review of December 21, 2012 Presentation – City of Flint Water Supply Assessment

Dear Mr. Kurtz:

As requested, we have reviewed the analysis of water supply alternatives for the City of Flint which was presented to the State Department of Treasury by Tucker, Young, Jackson, and Tull, Inc. (TYJT) on December 21, 2012. Our review is attached and summarizes the primary differences between the TYJT assessment and our previous studies and provides explanations of why we believe there are differences.

We have also reviewed the options for continued DWSD supply included in the TYJT presentation. It is not clear whether these are presented as specific offers on behalf of DWSD or included as examples for analysis, but we have noted some items which we believe should be addressed and considered as these options are compared.

If there are questions, please contact me.

Sincerely,
ROWE Professional Services Company

James E. Redding, P.E.
Vice President / Director of Engineering

Attachment

R:\Projects\04C0105\Docs\Correspondence Out\January 7 Kurtz.docx

Review of TYJT December 21, 2012 Presentation
City of Flint Water Supply Assessment
Prepared by Rowe Professional Services Company

DWSD Supply (Slides 7 through 9)

1. The 8 mgd maximum day supply by DWSD options can result in periods during the summer when most of the water to meet demands will be supplied by the City from the river. To aid in maintaining a consistent water quality, softening of the water from the river should be provided with this option, greatly increasing the City's costs.

2. Upgrades to Flint's WTP and dams will be needed for options requiring blending, since the WTP will be required to provide continuous, reliable service and compliance with recent surface water treatment regulations.

3. The rates for the options analyzed are shown on Slide 9 as "TYJT Estimates". Options and rates shown are different than presented by DWSD previously.

	DWSD 11/29/2012	TYJT Estimates
18 mgd Maximum Day - P&B	$16.24	$16.37
12 mgd Maximum Day - P&B	$16.30	$16.31
8 mgd Maximum Day -P&B		$12.68
12 mgd Maximum Day - Imlay	$14.38	$14.38
8 mgd Maximum Day - Imlay		$11.11

4. Since the rates used in the analyses are shown as estimates, are they actual offers or just presented as "what if" scenarios?

5. We assume that the Imlay options are based on transfer of the 72" main through Lapeer County to Flint. The analyses show a capital cost of $4.7 million; we assume that this is the proposed purchase / lease cost to Flint. This should be clarified along with pertinent details.

6. If the transmission main is transferred to Flint, what are Flint's responsibilities regarding service to the Lapeer County customers? If they remain DWSD customers, then Flint should receive some revenue for the use the main. It does not appear this is included in the TYJT analyses.

7. If the transmission main is transferred to Flint, we assume that the city will be responsible for the maintenance of the 50 year old main. The TYJT analysis did not include this.

8. Do the rates shown include the credit for "reliability" which had been discussed with DWSD?

9. If the point of commerce is changed from Baxter and Potter to Imlay, a new meter pit will be required. The cost of this does not appear to be included in the TYJT cost analyses.

Flint River Supply (Slide 10)

1. If any of the "blending" options are chosen, it will be necessary to upgrade the Flint WTP and dams to provide reliable, continuous service and compliance with recent surface water treatment regulations.

Data Collected (Slide 14)

1. The slide notes that Flint blending is based on DWSD supplying 2/3 and Flint supplying 1/3 of 12 MGD ADD. For the maximum day demand (18 mgd), if DWSD supplies a maximum of 8 mgd, Flint will supply 10 mgd or 56% of the total. However, such a large portion will make it more difficult to blend and achieve consistent water quality. Flint will need to soften water for these options.

Benchmarking Comparisons (Slide 16)

1. The slide subtitles are "KWA O&M Inflation Factor" and "DWSD and Flint Rate Inflation Factor". It seems appropriate to benchmark O&M costs for the KWA, because future costs of service will be dependent on how operating costs are impacted by inflation. For Flint, it does not seem appropriate that "rate inflation" from other utilities be used to determine the impact of inflation on future cost of service. Rates are impacted by inflation, but also by other factors such as debt and customer base. O&M expenses and rates are different and care should be exercised not to mix the two during analyses. The TYJT analyses apply an inflation factor (based on rates from other utilities) to the Flint WTP operating expenses, which does not seem to be consistent.

2. The KWA will supply raw water; SOCWA and YUCA both supply finished water. Regulations impact the O&M for finished water suppliers but should not impact the KWA O&M. The use of data from SOCWA and YUCA does not seem like a comparable comparison with the KWA. Finished water suppliers will have increased costs due to regulatory compliance, which really are not due to "inflation" of the costs of wages, power, chemicals, etc.

3. DWSD has a history of rates to Flint and other suburban wholesale customers. Rates tend to be quite specific to each utility, based on much more than just the costs of operating and maintenance. It appears that DWSD historical rates have not been considered in projecting future DWSD rate increases.

Capital Financing (Slide 17)

1. KWA bonds are planned to be general obligation bonds, backed by member counties.

O&M Inflation Factor (Slide 20)

1. SOCWA and YUCA are finished water suppliers; ever-changing regulatory requirements will impact their operating costs more than a raw water supplier, such as KWA.
2. KWA will be a supplier of raw water. O&M costs should primarily be limited to power and labor, with a little chemical use for zebra mussel control. KWA will not provide treatment of the water.

3. The KWA study assumed power, labor, and chemical costs increase at an annual average of 3%. TYJT indicated this is too low and suggested 5%.

4. Following are examples of historical inflation, which support the 3% as a reasonable assumption for O&M expenses (not rates)
    a. Labor- GCDC-WWS labor costs have increased at an annual average rate of 2.5% since 2003
    b. Electricity Rates in Michigan (per U.S. Energy Information Administration) have increased an average of 3.2% since 1999.
    c. The U.S. Bureau of Labor Statistics indicates that the inflation rate over the last 30 years has been an average of 2.8%.

Finished Water Rate Inflation (Slide 21)

1. TYJT bases their assumptions for rate inflation on a survey of rates from three other water suppliers, but ignored the actual rate history of DWSD. TYJT assumed DWSD rate increases of 4.4% annually (if water is purchased from P&B) and 2.9% annually (if water is purchased from Inlay). Based on the actual charges by DWSD to Flint, DWSD historical rates are as follows:
    a. 10 year increase in DWSD rates to Flint: 10.5% annually
    b. Average annual increase through 43 year history: 6.7%

2. Note that for the KWA analyses, an inflation factor has just been applied to power, labor, and chemicals. Although higher prices for labor, power, and chemicals impacts utility rates; rates are impacted by many other factors, many of which are not related to inflation. Rate inflation will likely be different than O&M inflation. Other factors impacting rates:
    a. Debt – the amount of debt varies widely between utilities
    b. Number of customers / quantity of water sold – there are many fixed expenses with a utility, that if are distributed amongst more users/more gallons sold will result in lower rates. Conversely, if there are fewer users or less water sold, the rates are higher. Assumptions regarding future water consumption will have a great impact on "rate inflation".

3. Unlike KWA and Flint operating expenses which will increase over time based on inflation, the cost of continued DWSD service should be based on the inflation of DWSD rates, to include the increasing cost of other DWSD expenses such as debt and the impact of reduced customers / demands in addition to increasing O&M expenses.

4. Even though there could be a one-time reduction in DWSD rates through adopting the model contract, limiting peak demands, and or changing the point of commerce; it doesn't seem reasonable to assume that subsequent annual increases will only average 4.4% through the 30 year period of analysis. This is significantly less than historical performance (yet TYJT suggests that inflation for KWA O&M expenses will increase at almost double the rate of historical indicators).

Capital Financing with Revenue Bonds (Slide 24)

1. Note that the KWA bonds will be general obligation bonds backed by the member counties.

2. The 2009 KWA Study assumed 6%, 25 year financing. The interest rate for planning was reduced in the 2012 Study update to 5%, which is still higher than if bonds were sold today.

3. Financial consultants determined the charges for purchasing capacity in the KWA supply based on the estimated project cost plus appropriate financing costs. Based on 60 units of capacity, $538,764,000 will be generated for repayment of debt and project costs using the capacity charges in the KWA capacity agreement.

25 years * 60 units * $355,300 / unit =	$532,950,000
3 years * 60 units * $32,300 / unit =	$ 5,814,000
	$538,764,000

4. For a KWA project cost of $272,421,558, total P&I is $483 million. The difference of $55,500,000 is available for financing expenses (capitalized interest, bond issuance costs, etc.) and additional contingencies.

5. Bond holder reserve is not a requirement for general obligation bonds.

6. TYJT assumed that 3% interest would be earned on the bond holder reserve during the 25 year bond period. Current interest rates are less than 1% and it seems inappropriate to assume such a high rate will be earned on retained funds.

7. Bondholder reserve, if provided, should be applied against the last couple of P&I payments. The TYJT did not apply it. This will reduce their project costs.

KWA Construction (Slides 26 through 29)

TYJT has indicated that the KWA construction cost estimate is too low. The primary differences in cost estimates for the project appear to be the following components:

1. Pump Stations (Slide 27) – The TYJT estimate for the pump stations is more than double that used by the KWA ($54,573,314 vs. $24,618,080). KWA estimates were based on actual construction costs from recent projectd completed by Genesee County within the last eight years.
   a. 32mgd water pump station including two-10 MG ground storage tanks - $13.4 million
   b. 80 mgd wastewater pump station, 50 feet deep wetwell – $8.3 million
   c. 30 mgd wastewater pump station, 50 feet deep wetwell – $9.4 million

   The KWA budgeted amount seems reasonable for two pumping stations as currently planned and to be constructed in rural areas (not southeast Michigan).

2. Redundant Power – There is no need for redundant power; other provisions will provide reliability of supply.

3. Land – Preliminary engineering has continued so earlier budgets established for planning for land acquisition can be greatly reduced. Options have been obtained on all properties which must be

purchased, so purchase prices are known. It will be necessary to obtain easements for only two miles of pipeline construction. All land costs are now estimated at $1.25 million.

4. Engineering, Legal, Administration & Contingencies
   a. The October 2012 KWA estimate provided an allowance of 25% of construction cost to cover engineering, legal, administration, and contingencies (ELAC). This was reduced from the 38% allowance used in the 2009 Study because ongoing planning and design have firmed up many of the details of the project, including:
      i. The intake design has been completed and all regulatory permits obtained.
      ii. The transmission main route has been determined. Meetings with road agencies have firmed up the requirements for construction and restoration within rights-of-way. Environmental review and permitting are in process.

   b. TYJT costs for Intake Crib, Pump Stations, and Transmission Mains (Slide 30) include a 30% allowance for ELAC. These allowances (from Slides 26 through 28) total $72,139,566. In addition, Slide 30 provides the following additional ELAC costs in the project total:

Design Engineering / Pump Stations	$16,939,581
Construction Management	$14,434,410
Administration	$ 349,440
Legal	$ 831,000
Total	$32,554,431

   c. Combining this with the $72,139,566 totals $104,693,997 or 43% of the estimated construction cost. We believe that such a high allowance for ELAC is not appropriate for a project of this magnitude where preliminary engineering and some design have already been completed.

Cost Comparison (Slide 30)

1. The TYJT pump station price is too high based on costs of similar projects; costs used by KWA are based on costs of recent local projects. The KWA estimate is believed to be sufficient for the proposed pumping stations.

2. Redundant power is not required; this does not need to be included in the TYJT estimate.

3. Land for LHPS – actual price is $360,000

4. Design Engineering / PS and Transmission – KWA included engineering in the 25% ELAC allowance included in the $207,752,895 estimated cost of transmission mains; TYJT included engineering in their 30% ELAC allowance included in the $218,811,559 estimated cost. By adding $16,939,581 for design engineering, $14,434,609 for construction administration, $349,440 for administration, and $831,000; it seems that ELAC is being "double-counted". The TYJT 43% allowance for ELAC seems unwarranted for a project with a great deal of preliminary and design engineering completed. The 25% KWA allowance is believed to be sufficient.

5. Easements and land (other than LHPS) should total $1,140,000, based on current options and specific needs for easements.

Other Considerations – Redundancy / Reliability (Slide 33)

1. Unfunded Mandates/ Future Regulations
    a. The proposed KWA supply will deliver raw water; it is not anticipated to be affected by future changes to regulations. Regulations will impact the City of Flint with respect to treatment and/or distribution of finished water. The City will be subject to these requirements with any of the DWSD blending options, just as they will be responsible for them if supplied by KWA. Some compliance costs may actually be less with the higher quality Lake Huron water rather than Flint River water as the source.

crypto & Cl in its on Flint River

2. State Goals
    a. The TYJT presentation indicates that creation of a new raw water supply is contrary to the governor's goals as suggested. However, the development of a new raw water supply provides new opportunities. Communities in Sanilac, St. Clair, and Lapeer counties will have the option to join a regional water supply and replace their small local supplies where limited supplies and high concentrations of arsenic have been a concern. The new water supply also provides great economic development opportunities. The raw water supplied by KWA will make a new commodity, raw water, available to the region. A large, low-cost supply of raw water can be a valuable resource for industries and agri-businesses. The development of a new water supply will also create construction jobs through the short term period of building the new water supply and subsequently over a longer period as new businesses and industries are developed in the area.
    b. The City of Flint and area communities will benefit as permanent jobs are created for operating and maintaining the local treatment facilities.

3. Redundancy
    a. We agree that the KWA and DWSD options are similar with respect to redundancy. Both provide the primary water supply; customers are responsible for their backup supply.

Other Considerations – Cost Slide 34

1. TYJT indicates that the DWSD 8 mgd supply option is the least cost alternative.
    a. The TYJT analysis does not include the cost of needed upgrades to the City's WTP or increased operating costs in their analysis. During summer months, water from the river will need to be softened before blending. More than half of the water supplied will be provided from the river. When the cost of upgrades to the WTP and the increased operating costs (for softening) are added to the TYJT analysis, the KWA option is less than the DWSD 8 mgd option.

2. For any of the DWSD "blending" options, upgrades will need to be made at the WTP to provide for continuous, reliable operation and compliance with new surface water treatment rules. Increased capital and operating costs for treating water from the river should be added to the TYJT costs for comparison with the other options.

3. Water from the river will require greater effort to treat than water from Lake Huron (more chemicals, power, and residuals). The TYJT analysis shows about the same O&M costs for the Flint WTP, regardless of water source. It seems that the WTP O&M costs for the KWA options should be reduced to reflect the savings from treating Lake Huron water.

4. The TYJT presentation noted that the KWA analysis did not include allowances for mechanical and process improvements within the planning period. The KWA will supply raw water. The facilities consist of pipe, pumps, and a tank. There are no treatment facilities which would be susceptible to future regulatory changes. The only improvements that seem likely would be the need to provide additional capacity. Capacity expansion is planned to be financed through capacity charges to new users.

5. The provision for redundant connections between the City's water system and the GCDC system was included in the most recent water supply agreement between the two, in 2011. Although not a KWA cost, the cost of the redundant connections should be considered with all options.

6. The $2.3 million budgeted for land by KWA was intended to cover all land requirements. Since the October update, options have been obtained on all land to be purchased and the locations of easements needed has been finalized. Total land costs are now estimated to be about $1.5 million.

7. The 2004 study included a 47% allowance for engineering, legal, administration, and contingencies (ELAC). The 2009 study reduced the allowance for ELAC to 37% because many of the details since the 2004 conceptual study had been better defined. For the October 2012 update, the allowance for ELAC was reduced to 25% because continued planning and preliminary engineering further addressed details from the earlier concepts.
    a. The detailed design (plans and specifications) and permitting have been completed.
    b. The transmission main route has been finalized. Meetings with road agencies have established requirements for construction and restoration within road rights-of-way. Environmental permitting is in process. The primary remaining unknown is pipe sizing, which is largely dependent on Flint's participation.

    It is our experience that the 25% ELAC allowance is appropriate for a project of this magnitude at this stage in the planning / design stage. The 43% ELAC allowance recommended by TYJT is excessive for a project in the design phase.

8. Flint's WTP as a backup to the KWA will be less difficult to provide for than the current arrangement as a backup to DWSD. We believe there is potential for challenges with chemistry and treatment for the proposed DWSD blending options, too.

9. It doesn't seem that oversizing the KWA capacity is a good solution for the city's water loss problems, if that is what is being suggested.

10. Yes, it would be nice if the KWA system could be constructed to firmly determine its cost and time to complete before making a decision about water supply alternatives. However, a decision is needed regarding Flint's participation so that the sizing and design can be completed, before it can be built.

Project Costs - TYJT Slides 26 through 30

	KWA	TYJT
Intake and Crib		
Construction	$22,076,850	$22,076,850
ELAC	$5,519,213	$5,519,213
Property	$2,300,000	$2,300,000
Pumping Stations		
Construction	$24,618,080	$54,573,314
Land		$75,000
ELAC	$6,154,520	$16,394,494
Transmission Mains		
Construction	$166,202,316	$167,419,530
ELAC	$41,550,579	$50,225,859
Easements		$1,166,170
Engineering		
Design Engineering		$16,939,581
Construction Management		$14,434,609
Administration		$349,440
Legal / Easements / Contracts		$831,000
Power	$4,000,000	$4,000,000
Redundant Power		$1,273,200
Total Construction	$212,897,246	$244,069,694
Total ELAC	$53,224,312	$104,694,196
Total Land / Property / Easements	$2,300,000	$3,541,170
Total Power	$4,000,000	$4,000,000
Total Redundant Power	$0	$1,273,200
Total	$272,421,558	$357,578,260
ELAC as % of Construction	25.0%	42.9%

Option	TYJT Total Cost	TYJT *minus* additional costs of river treatment	TYJT minus additional costs of river *treatment plus* redundant Flint-GCDC connections	TYJT minus additional costs of river treatment plus *redundant* connections less KWA reserve	TYJT minus additional costs of river *treatment plus* redundant connections less TYJT financing	TYJT plus Flint WTP		Adjusted Total Cost	Ranking
1 Flint WTP Only	$590,441,893							$590,441,893	3
2 DWSD 8 MGD Max Day at Imlay	$621,211,298					$771,289,948		$771,289,948	5
3 KWA 10/31/12 Update	$649,775,166	$534,615,996	$554,555,960					$554,555,960	1
4 DWSD 8 MGD Max Day at P&B	$657,167,877					$807,246,527		$807,246,527	6
5 KWA-1	$707,279,715	$592,120,545	$612,060,509		$572,731,459			$572,731,459	2
6 DWSD 12 MGD Max Day at Imlay	$707,994,386					$858,073,036		$858,073,036	8
7 DWSD 12 MGD Max Day at P&B	$742,168,081					$892,246,731		$892,246,731	9
8 KWA - 2	$766,784,313	$651,625,143	$671,565,107	$654,706,341				$654,706,341	4
9 DWSD 18 MGD Max Day at P&B	$791,202,885						$812,337,848	$812,337,848	7

b

Option for Water Supply	TYJT Projected 30 Year Total Cost	30 Year O&M Reduction for Treating Lake Huron Water	25 Year Bond Cost for Redundant Connections	Eliminate KWA Reserve	Use KWA 25 Year Capital Charge $355,300 / MGD	25 Year Bond Cost for Flint WTP Upgrades	Adjusted 30 Year Total Cost	Rank (Least to Highest Cost)
1 Flint WTP Only	$590,441,893		Included				$590,441,893	3
2 DWSD 8 MGD Max Day at Imlay	$621,211,298		Note 1			$150,078,650	$771,289,948	5
3 KWA 10/31/12 Update	$649,775,166	-$115,159,170	$21,134,963				$555,750,960	1
4 DWSD 8 MGD Max Day at P&B	$657,167,877		Note 1			$150,078,650	$807,246,527	6
5 KWA-1	$707,279,715	-$115,159,170	$21,134,963		-$39,329,050		$573,926,459	2
6 DWSD 12 MGD Max Day at Imlay	$707,994,386		Note 1			$150,078,650	$858,073,036	8
7 DWSD 12 MGD Max Day at P&B	$742,168,081		Note 1			$150,078,650	$892,246,731	9
8 KWA - 2	$766,784,313	-$115,159,170	$21,134,963	-$16,858,766			$655,901,341	4
9 DWSD 18 MGD Max Day at P&B	$791,202,885		$21,134,963				$812,337,848	7

Representative Genesee County Water and Wastewater Projects

Project	Description	All Engineering Fees	Engineer's Estimate	Bid Price	Final Construction Cost	Engineering & Contingency %
Fox Pump Station	30 mgd wastewater pump station & forcemain	$1,829,259		$12,394,273	$12,074,223	
		15.2%				
NEES Project	60" Relief Sewer - included tunneled sections		$54,707,212	$55,985,672	$69,999,429	
					28.0%	
North Water Loop	23 miles 36" and 48" transmission main, pump station, & 20 MG Reservoir	$4,102,630	$29,200,000	$25,570,110	$25,798,529	2.4%
		15.9%			-11.6%	
Henderson Road PS	32 MGD Water Pump Station & Two-10 MG Tanks		$12,046,368	$12,846,077	$13,517,582	
					12.2%	
Pump Station #1	80 MGD wastewater pump station	$1,735,063	$10,269,000	$8,225,400	$8,292,277	-2.4%
		20.9%			-19.2%	

Notes:

Engineering Fees include all planning, soils investigation, design, construction inspection & testing, and construction management costs

Engineering Fees % is based on final construction cost

Engineering and Contengency % is based on engineering fees + amount final construction cost exceeds estimate

Final Construction Cost % is based on difference between final construction cost and engineer's estimate

NEES Project Contractor went out of business during project - increasing cost to finish project

Projects constructed within last ten years

CITY OF FLINT
OFFICE OF EMERGENCY MANAGER
DARNELL EARLEY
ICMA-CM, MPA

Jason Lorenz
Public Information Officer
(810) 237-2039
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For Immediate Release:

City of Flint Takes Proactive Measures to Improve Water Distribution System and Address Compliance Issues

Flint, Michigan – January 2, 2015 – The City of Flint's Department of Public Works has been actively working to address upgrades and repairs to the city's water distribution system. These actions appear to have corrected several long time concerns with the system as well as known compliance issues with the system, including a recent temporary increase in the maximum contamination level (MCL) of trihalomethanes (TTHM) found in water samples collected from the system during a testing period which ended November 30, 2014. The public was notified of the violation as a precautionary measure as required by the Michigan Department of Environmental Quality (MDEQ).

TTHM is a common by-product of the water chlorination process. Increased levels in some water samples collected in the city were an indicator of weaknesses in the distribution system and treatment process, which were due to years of deferred repairs and upgrades to a very old system. The City of Flint's DPW is and has been pursuing a comprehensive plan to make critical upgrades to its water distribution system for the long term health and operation of the system and to mitigate any future issues.

–CONTINUE–

CITY OF FLINT
OFFICE OF EMERGENCY MANAGER
DARNELL EARLEY
ICMA-CM, MPA

The levels of TTHM in the water were elevated marginally above the MCL in some samples, resulting in a less urgent "Tier 2" Environmental Protection Agency notification. This means that the EPA believes there is no immediate risk to consumers and/or the system may have already returned to acceptable levels by the time the notice was issued. Although TTHM is considered to be an environmental pollutant that can be carcinogenic, it can only be hazardous if consumed in water containing the elevated levels at a rate of two liters per person, per day for 70 years. The City of Flint wants to assure the public that according to the MDEQ the water is safe for drinking and all other purposes.

The City of Flint worked closely with the MDEQ to correct the issue by flushing hydrants and replacing key valves in the distribution system. These measures have shown to be effective in not only lowering the TTHM levels in the system, but have also improved the overall health of the system. The Michigan DEQ has acknowledged and appreciates the progress of the City's preemptive evaluation of operations which identified the deficiencies and the corrective measures being taken. The latest round of testing has shown a significant decrease in levels across the board, with most samples falling well below the MCL. It is expected that all sample levels will be well below the MCL in the next round of quarterly scheduled testing in March of 2015.

Flint's DPW welcomes the rigorous review of the MDEQ to ensure steady progress is made on this important issue. "Our proactive plan of replacing valves, flushing hydrants and making other adjustments to the system has shown both promising short term

–CONTINUE–

results as well as strengthening our water distribution capability in the long term," said Flint DPW Director Howard Croft. Both the City of Flint and the MDEQ expect the corrective measures being implemented will resolve the issue by early 2015.

The improvements in MCL levels also mirror the increased consistency being seen in chlorine residuals, flow rates, and overall water quality within the city. As part of the DPW strategic plan and Capital Improvement Plan, there are additional improvements coming to the 600 miles of distribution main including, pipe replacements, leak detection, hydraulic modeling, and enhanced asset management features. The Department of Public Works will continue to provide public education and communication about the quality, the process, and the continual improvements occurring within the system as part of the overall management of the water system.

–END–

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

City of Flint Did Not Meet Treatment Requirements

Our water system was recently found to be in violation of a drinking water standard. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we are doing to correct this situation.

We routinely monitor for the presence of drinking water contaminants. Samples were collected for total trihalomethanes (TTHM) analysis from eight locations on a quarterly basis (May 21, August 21, and November 20 of 2014). The average of the results at **ANY** of the eight locations must not exceed the maximum contaminant level (MCL) for TTHMs, otherwise our water system exceeds the Maximum Contaminant Level (MCL). The standard for TTHMs is 80 ug/L. The location reporting the highest TTHM level was 93 ug/L, thus, our water system exceeds the TTHM MCL.

What should I do?

- There is nothing you need to do unless you have a severely compromised immune system, have an infant, or are elderly. In that case, you may be at increased risk and should seek advice about drinking water from your health care provider.
- You do not need to boil your water or take other corrective actions. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours.

What does this mean?

This is not an emergency. If it had been an emergency, you would have been notified within 24 hours.

People who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.

What is being done?

We are currently working on solutions to correct the problem. We anticipate resolving the problem in 2015.

For more information, please contact Mr. Brent Wright or Mike Glasgow at 810-787-6537 or the Water Plant at 4500 North Dort Highway, Flint, MI 48505.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by the City of Flint.

CERTIFICATION: F1 S3 WSSN: 02310

I certify that this water supply has fully complied with the public notification requirements in the Michigan Safe Drinking Water Act, 1976 PA 399, as amended, and the administrative rules. Reminder to water supplier: This notice/certification must be sent to the DEQ.

Signature	Title	Date Distributed
Michael Glasgow	Assistant Supervisor	11/6/15

2015 Drinking Water Infrastructure Needs Survey And Assessment

U.S. Environmental Protection Agency
Washington, DC 20460

OMB Control No.: 2040-0274
Approval Expires: 06/30/2018
Federal PWSID No.: MI0002310

MI0002310

Please verify or correct the following information:

		Check If Correct as Printed	Corrected Information *(Fill in only if preprinted information is missing or incorrect)*
Name of System (Community):	FLINT, CITY OF	☐	
Name of Contact: Street Address: City, State, and Zip:	WRIGHT, BRENT Flint Water Plant, 4500 North Dort Highway FLINT, MI, 48505	☐	
Population Served (if wholesaler, include consecutive population as appropriate)	102,434	☐	
Number of Connections (not including consecutive systems):	35,132	☐	
Total System Design Capacity (in MGD):		☐	
Total Length of Pipe in System (in Feet):	2,927,860	☐	
Source Water Type (Ground, Surface/GWUDI, etc.):	Surface/GWUDI	Check All That Apply: ☐ Ground ☐ Surface/GWUDI ☐ Purchased Ground ☐ Purchased Surface/GWUDI	
Ownership Type:	Public	Check All That Apply: ☐ Public ☐ Investor-Owned or Private Non-Profit ☐ Federal Government	

Public reporting burden for this collection of information is estimated to average 5.53 hours per response. This estimate includes time for reviewing the instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collected. Burden means the total time, effort, or financial resources expended by person(s) to generate, maintain, retain, or disclose or provide information to or for a Federal Agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information; adjust the existing ways to comply with any previously applicable instructions; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR Part 9 and 48 CFR Chapter 15.

Send comments on the Agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, including through the use of automated collection techniques to the Director, OPPI, Regulatory Information Division, U.S. Environmental Protection Agency (1804A), Ariel Rios Building, 1200 Pennsylvania Ave., NW, Washington, DC 20460, and Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th Street, N.W., Washington, DC 20503.

State Use Only
State Reviewer: _____ Telephone Number: _____

Information provided for this survey can be requested by the public. It is our experience that this information is rarely requested.

1000 – Not totally done/expanded op. system/new equipment
want to wait for automation – next phase to be all up to
provide updated cost to explain project – basis what was done

1002 – upgrade/rehab new SCADA that was installed

1001 chem storage ~~Acid~~ not done not start on 4/15
Lime – done
Soda Ash – N.A
Elec/SCADA – completed
Pant elec/Enclo – N.A
Security – started after 4/15
Low/Hi Serv – started after 4/15
Filter Transfer/ UV – not started – still need
& GAC – Lead – need Doc

151 Mill
+16
167 WTP exp

1003 WTP – Rehab 28 MGD
– membrane mods installed/no serv – contact → 8 – cyclone

1005
1006 not done
1007 – Done → Rehab for this survey
1008 –
1009 – NOANO
1010 –
1011 – Not Done

Project Table

Federal PWSID No.: MI0002310

Project Number	Project Name	Type of Need	Reason for Need	N.E.R.H (New, Expand, Replace, Rehab)	C or F (Current, Future)	Regulation	Design Capacity (MG, MGD, or kW)	Diameter (inches)	Length (feet)	Number Needed	Cost Estimate	Cost Date (mm/yyyy)	Documentation	Remove, Modify or Validate
Ex. 1	Replace wells 5 and 8 at 0.5 MGD each	R1	A1	R	C	4A	0.5			2			6, 10	
Ex. 2	Replace Deteriorated Transmission Main	X2	A1	R	C	4A		24	20,000		$4,200,000	06/2015	1	
1000	TREATMENT PLANT PROCESS SCADA	W2	A1	R	F	4A					$978,000	09/2011	2, 10	
1001	WTP EXP	T10	A1	E	F	4A					$40,258,000	09/2011	2, 10	*
1002	PS3 PUMP #1 REPLACE	M99, P1	A1, A4	R	F	4A	8			1			20	
1003	PS3 PUMP #2 REPLACE	M99, P1	A1, A4	R	F	4A	12			1			20	
1004	PS3 PUMP #3 REPLACE	M99, P1	A1, A4	R	F	4A	16			1			20	
1005	PS3 STAND-BY POWER	M99, W4	A11	N	F	4A	20			1			10, 20	*
1006	PS5 STAND-BY POWER	M99, W4	A11	N	F	4A	20			1			10, 20	*
1007	REPLACE SWITCHGEAR @ PS3	P2	A1											
1008	REHAB TORREY RD BOOSTER STA.	P2	A1	H	C	4A				1	$241,000	07/2011	2, 3, 10	
1009	CEDAR ST. RESERVOIR REHAB	S2	A1	H	F	4A	20			1			20	
1010	WEST SIDE RESERVOIR REHAB	S2	A1	H	F	4A	12			1			20	
1011	PUMP STATION 5 RE-HAB	P2	A1	H	F	4A	24			1			20	
2000	UPGRADE 3-FOOT & 4-INCH MAINS WITH 8-INCH	M1	A1	R	C	4A			102500		$12,000,000	02/2007	20	*
2001	REPLACE CRITICAL 6-INCH MAINS WITH 8-INCH	M1	A1	R	C	4A			15000		$1,000,000	02/2007	20	*
2002	LOOP EXSISTING 6-INCH MAINS WITH 8-INCH	M1	A1	N	C	4A		8	3025				10	*
2003	LOOP EXSISTING 12-INCH MAINS	M1	A1	N	C	4A		12	800				10	*
2004	REPLACE EXISTING 6-INCH MAIONS WITH 8-INCH	M1	A1	R	C	4A		8	91000				20	*
2005	REPLACE 8-INCH MAINS	M1	A1	R	C	4A		8	45800				20	*
2006	REPLACE 10-INCH & 12-INCH MAINS WITH 12-INCH	M1	A1	R	F	4A		12	15600				20	*

10% 292,786 - 102,500 - 15,000 = 180,286 61.6%

Project Table

Federal PWSID No.: MI0002310

Project Number	Project Name	Type of Need	Reason for Need	N.E.R.R. (New, Expand, Replace, Rehab)	S or E (Current, Future)	Regulation	Design Capacity (MG, MGD, or kW)	Diameter (inches)	Length (feet)	Number Needed	Cost Estimate	Cost Date (mm/yyyy)	Documentation	Remove, Modify, or Validate
2007	REPLACE 14-INCH AND 16-INCH MAINS WITH 16-INCH	M1	A1	R	F	4A		16	10400				20	*
2008	REPLACE 18-INCH MAINS	M1	A1	R	F	4A		18	4160				1, 2, 20	*
2009	REPLACE 24-INCH MAINS	X2	A1	R	C			24	7800				20	*
2010	REPLACE 30-INCH MAINS	X2	A1	R	C			30	1040				20	*
2011	REPLACE 36-INCH MAINS	X2	A1	R	C	4A		36	715				20	*
2012	LOOP EXSISTING 8-INCH MAINS	M1	A1	N	C	4A		8	400				10	*
2013	REPLACE 42-INCH MAINS	X2	A1	R	F	4A		42	95				20	*
2014	REPLACE 72-INCH MAINS	X2	A1	R	C	4A		72	3744				20	*
3000	REPLACE RESIDENTIAL METERS	M8	A1	R	C	4A		0.625		32931			10	
3001	REPLACE RESIDENTIAL METERS	M8	A1	R	C	4A		1		471			10	
3002	REPLACE RESIDENTIAL METERS	M8	A1	R	C	4A		1.5		393			10	
3003	REPLACE RESIDENTIAL METERS	M8	A1	R	C	4A		2		20			10	
3004	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		0.625		439			10	
3005	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		1		281			10	
3006	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		1.5		350			10	
3007	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		2		368			10	
3008	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		3		107			10	
3009	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		4		71			10	
3010	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		6		47			10	

Replaced

Project Table

Federal PWSID No.: MI0002310

Project Number	Project Name	Type of Project	Reason for Project	N, E, R, or I (New, Expand, Replace, Rehab)	C or F (Current, Future)	Regulation	Design Capacity (MG, MGD, or kW)	Diameter (inches)	Length (feet)	Number Needed	Cost Estimate	Cost Date (mm/yyyy)	Design Period (years)	Remove, Modify or Update
3011	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		8		3			10	
3012	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		10		6			10	
3013	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		16		1			10	
3014	REPLACE COMMERCIAL METERS	M8	A1	R	F	4A		24		1	NC		10	
3015	LEAD SERVICE REPLACEMENT	M2	A1, A6	R	C	1D		1		18000			10	*
3017	OTHER SERVICE LINE REPLACEMENT	M2	A1	R	F	4A		1		3238			10	*
3018	REPLACE SERVICE LINES > 1-INCH	M2	A1	R	F	4A				275			10	*

Leaks replaced

Source, Treatment, Storage, and Pumping Inventory

To ensure all potential source, treatment, and storage projects are considered, it may be helpful to complete some or all of this inventory table. However, completion of this table is not required.

- **Source Projects** are all projects related to collecting and pumping raw water. This includes wells, surface water intakes, springs, off-stream raw water storage, and pumps.
- **Treatment Projects** are all projects related to disinfection, filtration, or other treatment processes for ground or surface water sources, or for treatment applied in the distribution system.
- **Storage and Pumping Projects** are related to finished or treated water storage, and booster pump stations.

Source Water			
Inventory	**Needing Replacement**	**Needing Rehabilitation**	**New Infrastructure Needs**
Total Number and Capacity of Existing Wells or Springs:	Wells (pumps included) or Springs:	Wells (pumps included) or Springs:	Does your system have additional source water capacity needs to meet the needs of current users? ☐ Yes ☐ No If yes, how many additional sources are necessary?
Total Number and Capacity of Existing Surface Water Sources:	Existing Surface Water Intakes (excluding pumps):	Existing Surface Water Intakes (excluding pumps):	
Total Number and Capacity of Existing Pumps (excluding booster pump stations):	Existing Groundwater Pumps (if wells not listed):	Existing Groundwater Pumps (if wells not listed):	
	Existing Raw Surface Water Pumps:	Existing Raw Surface Water Pumps:	

Treatment			
Inventory	**Needing Replacement**	**Needing Expansion/Upgrading or Rehabilitation**	**New Infrastructure Needs**
For the sources identified above, enter the number of locations where the following treatment is applied:			Does your system have additional treatment needs for provisions of additional public health protection or for aesthetic concerns? ☐ Yes ☐ No If yes, how much additional treatment is necessary?
Disinfection (including booster disinfection):	Disinfection:	Disinfection:	
Filtration:	Filtration:	Filtration:	
Chemical removal or addition:	Chemical treatment:	Chemical treatment:	

Storage and Pump Stations			
Inventory	**Needing Replacement**	**Needing Rehabilitation**	**New Infrastructure Needs**
Total Number and Capacity of Existing Storage Tanks:	Number of Existing Elevated or Ground-Level Storage Tanks:	Number of Existing Elevated or Ground-Level Storage Tanks:	Does your system have additional storage capacity and/or booster pumping needs to meet the needs of current users? ☐ Yes ☐ No If yes, how much additional finished water storage or booster pumping capacity is necessary?
Total Number and Capacity of Existing Booster Pump Stations:	Number of Existing Booster Pump Stations:	Number of Existing Booster Pump Stations:	

Transmission and Distribution Inventory

Transmission and distribution projects are the piping needs of a water system. Projects for **valves, backflow prevention devices and assemblies, and meters** that are not part of a transmission or distribution project listed in this table should be recorded in the table under the tab titled "Inventory Table 3".

On the table below, please provide an estimate of the total feet or miles of pipe in your system, if possible. Completion of this table is not required, but it may be helpful to ensure all potential transmission and distribution pipe projects are considered.

Note: The total feet or miles of pipe in your system is required information if any pipe projects are submitted based solely on survey-generated documentation (documentation codes 10 or 11).

☐ feet ☐ miles **Total Pipe in System** *(Check feet or miles)*: _____

	Total Pipe in System *(Check feet or miles)*		<=6 inch	8-12 inch	15-42 inch	>=48 inch
Plastic	_____ ☐ feet ☐ miles	Amount of PVC by pipe size	_____ ☐ feet ☐ miles	_____ ☐ feet ☐ miles	_____ ☐ feet ☐ miles	_____ ☐ feet ☐ miles
	_____ % of total pipe	% of this category/size pipe currently in poor condition or beyond useful life	_____ %	_____ %	_____ %	_____ %
Ductile Iron	_____ ☐ feet ☐ miles	Amount of ductile iron by pipe size	_____ ☐ feet ☐ miles	_____ ☐ feet ☐ miles	_____ ☐ feet ☐ miles	_____ ☐ feet ☐ miles
	_____ % of total pipe	% of this category/size pipe currently in poor condition or beyond useful life	_____ %	_____ %	_____ %	_____ %
Cast Iron	_____ ☐ feet ☐ miles	Amount of cast iron by pipe size	_____ ☐ feet ☐ miles	_____ ☐ feet ☐ miles	_____ ☐ feet ☐ miles	_____ ☐ feet ☐ miles
	_____ % of total pipe	% of this category/size pipe currently in poor condition or beyond useful life	_____ %	_____ %	_____ %	_____ %
Asbestos Cement	_____ ☐ feet ☐ miles	Amount of asbestos cement by pipe size	_____ ☐ feet ☐ miles	_____ ☐ feet ☐ miles	_____ ☐ feet ☐ miles	_____ ☐ feet ☐ miles
	_____ % of total pipe	% of this category/size pipe currently in poor condition or beyond useful life	_____ %	_____ %	_____ %	_____ %
Other	_____ ☐ feet ☐ miles	Amount of other by pipe size	_____ ☐ feet ☐ miles	_____ ☐ feet ☐ miles	_____ ☐ feet ☐ miles	_____ ☐ feet ☐ miles
	_____ % of total pipe	% of other currently in poor condition or beyond useful life	_____ %	_____ %	_____ %	_____ %

Meters, Service Lines, Backflow Prevention Devices/Assemblies, Valves, etc.

Projects for meters, service lines, backflow prevention devices and assemblies, valves, and other miscellaneous projects are recorded in this section to accommodate entries of multiple identical items on one line in the project table.

Record only projects that are not a part of another project (e.g., water main replacement projects will already include valves and other appurtenances).
EPA requires documentation of all projects provided. Applicable types of documentation are presented in List 4 of the Lists of Codes.
Use only existing documentation of cost. We do not expect you to develop new cost estimates.

To ensure all potential projects are considered, it may be helpful to complete some or all of this inventory table. However, completion of this table is not required.

Inventory	Needing Replacement	New Infrastructure Needs
Total Number of Existing Water Meters:	Number of Water Meters:	Number of Water Meters:
Total Number of Existing Backflow Prevention Devices/Assemblies:	Number of Backflow Prevention Devices/Assemblies:	Number of Backflow Prevention Devices/Assemblies:
Total Number of Valves:	Number of Valves:	Number of Valves:
Total Number of Lead Service Lines:		

Respondent Information

Please provide the following information in case we need to contact you for clarification or additional explanation of any of your responses.

Contact Person (Person who completed this questionnaire):

Signature: _____

Name (please print): _____

Title: _____

Mailing Address: _____

(Street Address) _____

_____

Telephone Number: _____

Fax Number: _____

E-mail Address: _____

Best Time to Reach You: _____

If you have any questions, contact your state coordinator.

CLOSING: Thank you for your help. Did you remember to?

☐ Identify, by project number, available documentation for all needs and costs reported?

☐ Email the questionnaire and email or mail the documentation to your state?

	Summary of Survey-Generated and Independent Documentation for Each Project			Federal PWSID No.:	MI0002310
Project Number	*Project Name*	*Documentation Code(s)*	*State/System Survey-Generated Statement*	*Independent Document Name*	*Independent Documentation Page Number(s)*
1000	TREATMENT PLANT PROCESS SCADA	2, 10			
1001	WTP EXP	2, 10			
1002	PS3 PUMP #1 REPLACE	20			
1003	PS3 PUMP #2 REPLACE	20			
1004	PS3 PUMP #3 REPLACE	20			
1005	PS3 STAND-BY POWER	10, 20			
1006	PS5 STAND-BY POWER	10, 20			
1007	REPLACE SWITCHGEAR @ PS3				
1008	REHAB TORREY RD BOOSTER STA.	2, 3, 10			
1009	CEDAR ST. RESERVOIR REHAB	20			
1010	WEST-SIDE RESERVOIR REHAB	20			
1011	PUMP STATION 5 RE-HAB	20			
2000	UPGRADE 3-FOOT & 4-INCH MAINS WITH 8-INCH	20			
2001	REPLACE CRITICAL 6-INCH MAINS WITH 8-INCH	20			
2002	LOOP EXSISTING 6-INCH MAINS WITH 8-INCH	10			
2003	LOOP EXSISTING 12-INCH MAINS	10			
2004	REPLACE EXISTING 6-INCH MAIONS WITH 8-INCH	20			
2005	REPLACE 8-INCH MAINS	20			
2006	REPLACE 10-INCH & 12-INCH MAINS WITH 12-INCH	20			

Project Number	Project Name	Documentation Code(s)	State/System Survey-Generated Statement	Independent Document Name	Independent Documentation Page Number(s)
2007	REPLACE 14-INCH AND 16-INCH MAINS WITH 16 INCH	20			
2008	REPLACE 18-INCH MAINS	1, 2, 20			
2009	REPLACE 24-INCH MAINS	20			
2010	REPLACE 30-INCH MAINS	20			
2011	REPLACE 36-INCH MAINS	20			
2012	LOOP EXSISTING 8-INCH MAINS	10			
2013	REPLACE 42-INCH MAINS	20			
2014	REPLACE 72-INCH MAINS	20			
3000	REPLACE RESIDENTIAL METERS	10			
3001	REPLACE RESIDENTIAL METERS	10			
3002	REPLACE RESIDENTIAL METERS	10			
3003	REPLACE RESIDENTIAL METERS	10			
3004	REPLACE COMMERCIAL METERS	10			
3005	REPLACE COMMERCIAL METERS	10			
3006	REPLACE COMMERCIAL METERS	10			
3007	REPLACE COMMERCIAL METERS	10			
3008	REPLACE COMMERCIAL METERS	10			
3009	REPLACE COMMERCIAL METERS	10			
3010	REPLACE COMMERCIAL METERS	10			
3011	REPLACE COMMERCIAL METERS	10			
3012	REPLACE COMMERCIAL METERS	10			

Project Number	Project Name	Documentation Code(s)	State/System Survey-Generated Statement	Independent Document Name	Independent Documentation Page Number(s)
3013	REPLACE COMMERCIAL METERS	10			
3014	REPLACE COMMERCIAL METERS	10			
3015	LEAD SERVICE REPLACEMENT	10			
3017	OTHER SERVICE LINE REPLACEMENT	10			
3018	REPLACE SERVICE LINES > 1-INCH	10			

Project Table (Compare 2011 to 2015)

Federal PWSID No.: MI0002310

Project Number	Project Name	Type of Need	Reason for Need	N E R H (New Expand Replace Rehab)	C or F (Current Future)	Regulation	Design Capacity (MG, MGD, or kW)	Diameter (inches)	Length (feet)	Number Needed	Cost Estimate	Cost Date (mm/yyyy)	Documentation	Remove Modify or Validate

- Start w. Print - Hi-Dir
- Duty

Cat/Cond - 19 EFM Rule
- can not/ vote
- Major/ conduct restraint
Address Env for 18 mod
two week 98 - 1
- Lawn
2nd week go - can't go 4/18
Council motion to modify to 15-0 mod
Phone conduct taste
to discuss 15 vs. 18 Monday

$2.5 mil sales. on 15 vs 18

Need kids cap
Sept on cond to 2.0
send to Finn - cap. Line 8 cc: John

- industrial Vacancy
- give Rick to estimate for 5

18 workers # Folks worked on
Bid then 15 was picked - inadvertently

Social OS ex: Bent-wight

Env. 0 points

Ref: 4k capacity eqpt in ADM Rds

Rec'd - Need special Pan water supply eqpt - Row need new

- Adjst Vacuums
- Paint Box/ext - comb. # can't read add
- Written on instructions on Rec.
- Clean for future capacity eqpt.
- Ruled by Study - 8030 Rule is carried on our SAN survey

~~Avail capacity and for pkl~~

City of Flint
Water Reliability Study
Phase 1

June 2010

Prepared by:
ROWE PROFESSIONAL SERVICES COMPANY
and Potter Consulting

Section 1 - Introduction

1.1 Background

The City of Flint currently provides water service to a population of approximately 118,000 through an extensive network of transmission and distribution mains. Many of these mains are aging and are in need of replacement. The city also operates several booster pumping stations and storage facilities to boost pressures and enhance service. The *City of Flint Water System Review* performed by the Michigan Department of Environmental Quality, Drinking Water & Radiological Protection Division in 2008 rated the water distribution system as "deficient", citing key improvements being necessary to the water supply including:

- Distribution system improvements
- Transmission system improvements
- Improvements to pumping stations
- Development of an Asset Management System

The review also states that much of the piping within the City of Flint is more than 70 years old and is in serious need of replacement. The City of Flint Water Service Center, which operates and maintains the water system, spends a significant amount of time repairing mains that are in poor condition. Each winter, a large number of water main breaks occur due to the aging condition of the water mains. These breaks result in interruptions in water service and potential public health risks to city customers.

In response to this deficiency rating the city retained ROWE Professional Services Company to develop a Water System Reliability Study to correct these deficiencies.

Before beginning the Water Reliability Study process, ROWE Professional Services Company met with City of Flint officials and Michigan Department of Natural Resources and Environment (DNRE) staff to determine the goals of the study. These discussions produced a three-phase approach to addressing the issues raised by DNRE.

A. **Phase 1 Model Update and Short Term CIP**

Key tasks include:

- Update the city's water model including demand allocations, pumping and storage facilities, piping changes, and other associated infrastructure
- Update the city's General Water Plan
- Evaluate existing conditions and develop a short-term (6 year) Capital Improvement Plan
- Update the Contingency Plan
- Calibrate the city water model
- Analyze valve and hydrant deficiencies

B. **Phase 2 Distribution System Asset Management and 20-Year Capital Improvement Plan**

Key tasks include:

- Develop modeling scenarios for 20-year water system plan
- Develop 20-year plan for the water system
- Prepare cost opinions for 20-year plan
- Analyze rate structure to support 20-year plan
- Develop an asset management plan
- Inventory water distribution system assets

C. **Phase 3 Water Treatment Plant Asset Management Plan and 20-Year Capital Improvement Plan**

Key Tasks Include:

- Develop modeling scenarios for 20-year water treatment plant
- Develop 20-year plan for the water treatment plant
- Prepare cost opinions for 20-year plan
- Analyze rate structure to support 20-year plan
- Develop an asset management plan
- Inventory water treatment plant assets

1.2 Existing Conditions

A. **Source Facilities**

The City of Flint purchases treated water from the City of Detroit through the DWSD. The treated water is supplied to Flint via a 72-inch transmission main. This transmission main also provides water service to Genesee County and several other communities between Flint and Detroit. The flow to the City of Flint is metered to provide accurate water use records.

The city also maintains a water treatment plant as a backup supply in the event that the City of Detroit water supply is interrupted. Work to upgrade the City of Flint water treatment plant began several years ago and is progressing to completion. A number of test runs were initiated in 2006, 2007, and 2008. Additional test runs are planned for the future. The majority of the improvements at the plant have been implemented as a result. The plant is generally ready for use in a standby capacity, in the event that service from the City of Detroit water supply is interrupted. Long-term plans include provisions for expanding the capacity of the plant and implementing a softening system.

B. **Water Treatment**

The water purchased from DWSD is already treated prior to reaching the City of Flint system; typically, no further treatment is required. The City of Flint also owns and operates a water treatment plant located at 4500 North Dort Highway, which serves as a backup supply in the event of a major

hammer caused by the spring check valves upon start up and shut down of the pumps. This work was budgeted for 2006 and 2007, but never implemented. The city is currently working to implement these upgrades in 2010.

6. Torrey Road Pumping Station

The Torrey Road pumping station is equipped with two centrifugal pumps rated at 2.8 mgd and 4 mgd, respectively. Both pumps were installed in 1954. The station has a total pump capacity of 6.8 mgd and a firm pump capacity of 2.8 mgd. The primary function of this station is as an in-line booster pumping station to provide increase pressures to the southwest portion of the city. This pumping station takes suction from the 24" transmission main along Hammerburg Road and discharges to the 18" transmission main supplying the southwest pressure district. There is no standby power provided to this pumping station.

The City of Flint has made plans to replace the existing pumps and piping in the station. The existing pumps have exceeded their useful life and the piping and valves are in poor condition. The station is scheduled for upgraded pumps and interior piping in 2010. Permit applications were submitted to DNRE in April 2010.

D. Condition of Service Lines

Service lines appear to be in adequate condition with typical repairs made by city staff, depending on the age of the existing water main and water services connected to it. The city does experience problems with a number of existing valves. The long-term needs for the system include replacement of the existing valves over the next 20 years. The total estimated cost to replace the valves is approximately $2,000,000.

E. **Type of Conveyance System**

The conveyance system of the City of Flint consists of water distribution and transmission main ranging in size from 4" to 72" in diameter. Many of these mains exceed 70 years old, and the majority is constructed of cast iron or ductile iron pipe up to 24" in diameter. Transmission mains larger than 24" are primarily constructed of steel piping. A breakdown of the distribution system pipe sizes by percentage is provided in the *City of Flint Water System Review*, prepared by the MDEQ, located in Appendix A.

The majority of the city's system has adequate transmission piping to convey sufficient flows and pressure for fire protection. However, the distribution and transmission system are old and in serious need of replacement. Every year, a large number of water main breaks occur within the city. These breaks, which are repaired by city staff, result in serious water service disruptions and potential water quality problems to customers of the City of Flint. The six year Capital Improvement Program in Table 1 is intended to remedy the most pressing of these infrastructure problems and Phase 2 of this study will take a long term look at system wide problems and solutions.

project 0009

- Phase I of Rel. & Lt. Study

Table 1: 6-Year Capital Improvement Table

Project Number	Capital Improvement Program	Design Status	Construction Status	2010 Construction Costs	Contingencies, Engineering, Management Legal (CEM&L @ 47%)	Total CIP Project Cost
	Major Booster Station Improvement Projects					
Project 1	Torrey Road Booster Upgrades (In-house)	Design Complete	Construct 2010	$300,000	$141,000	$441,000
Project 2	Water Pumping Station 3 Electrical and Controls Upgrade	Design in progress	Construct 2010	$900,000	$423,000	$1,323,000
	Sub Total			$1,200,000	$564,000	$1,764,000
Project 3	**Major Transmission System Improvement Projects**					
Project 4	8,000 LFT of 24" watermain; WTP to Dupont; South to University	Design Complete	Construct 2011	$3,000,000	$1,410,000	$4,410,000
Project 5	Water Meter Replacement Program 3,000 meters/year		2010-2015	$1,000,000		$5,000,000
Project 6	3000 LFT of 12" watermain; Saginaw St; Flint River to Pierson Rd	2010	2012	$1,200,000	$564,000	$1,764,000
Project 7	5,280 LFT of 12" watermain; Atherton Rd, Van Slyke to Dort	2010	2013	$2,000,000	$940,000	$2,940,000
	Sub Total			$9,200,000	$2,914,000	$24,114,000
	Minor Transmission System Improvement Projects					
Project 8	500 LFT of 6" watermain; Hamilton Ave, Mason St to MLK Blvd.	2010	2011	$50,000	$23,500	$73,500
Project 9	1,650, LFT of 6" watermain; Sonny Ave, Dupont to Lawndale	2010	2011	$165,000	$77,550	$242,550
Project 10	1500 LFT of 6" watermain; Walton St, Clairmont to Augusta	2010	2012	$150,000	$70,500	$220,500
Project 11	1500 LFT of 6" watermain; East Blvd, Farmers Market to Park	2011	2013	$150,000	$70,500	$220,500
Project 12	325 LFT of 6" watermain; Alexander St, Taylor to Rankin	2011	2014	$32,500	$15,275	$47,775
Project 13	1075 LFT of 6" watermain; Mack St, Clio Rd to Winona	2011	2015	$122,500	$57,575	$180,075
	Sub Totals			$670,000	$314,900	$984,900
	Total CIP Costs			$11,070,000	$3,792,900	$26,862,900

Prysby, Mike (DEQ)

From: Shekter Smith, Liane (DEQ)
Sent: Wednesday, October 31, 2012 5:04 PM
To: Prysby, Mike (DEQ)
Subject: FW: Briefing on Karegnondi Project/City of Flint

FYI

Liane J. Shekter Smith, P.E., Chief
Office of Drinking Water and Municipal Assistance
Michigan Department of Environmental Quality
517-373-9523

From: Shekter Smith, Liane (DEQ)
Sent: Monday, October 29, 2012 11:33 AM
To: Wyant, Dan (DEQ); Creagh, Keith (DNR); Clover Adams, Jamie (MDA); Sygo, Jim (DEQ)
Cc: Creal, William (DEQ); Anderson, Madhu (DEQ); Datema, Maggie (DEQ)
Subject: RE: Briefing on Karegnondi Project/City of Flint

Just so everyone is on the same page:

Karegnondi Water Authority (KWA) has received a permit to construct an intake structure in Lake Huron from DEQ. If not already started, construction is planned for this fall.

I recall some discussion with Genesee County about using the raw water line to also provide water for agricultural purposes and possibly a utility in the area. Staff (Mike Prysby) is meeting with the county Wednesday to discuss big picture technical items on the project. We will be sure to remind the county at this meeting that the water withdrawal permit is restricted to drinking water use.

When we met with KWA and the city of Flint last spring, Flint had not yet decided whether to join the authority or not. We have not received word that a decision has been made. At one time, it appeared that DWSD would allow the city of Flint to blend DWSD water with Flint River and/or KWA drinking water; however we have heard third-hand that this may not be acceptable to DWSD. We have not seen anything in writing.

Liane J. Shekter Smith, P.E., Chief
Office of Drinking Water and Municipal Assistance
Michigan Department of Environmental Quality
517-373-9523

From: Wyant, Dan (DEQ)
Sent: Sunday, October 28, 2012 2:12 PM
To: Creagh, Keith (DNR); Clover Adams, Jamie (MDA); Sygo, Jim (DEQ)
Cc: Creal, William (DEQ); Shekter Smith, Liane (DEQ); Anderson, Madhu (DEQ); Datema, Maggie (DEQ)
Subject: FW: Briefing on Karegnondi Project/City of Flint

Andy Dillon is getting pulled into this issue. Andy asked the Governor at the Group Executive meeting if the administration has a position on this project. The Governor said he needs to know more. I think we have all been

approached on this project. Keith/Jamie, have you taken a position on this? Bill, am I correct in saying this will have effect on DWSD?

Dan Wyant, Director
Department of Environmental Quality
517-373-7917

From: Dillon, Andy (Treasury)
Sent: Wednesday, October 24, 2012 4:18 PM
To: Wyant, Dan (DEQ)
Subject: Fwd: Briefing on Karegnondi Project/City of Flint

Sent from my iPad

Begin forwarded message:

> **From:** "Fraser, Roger (Treasury)" <FraserR1@michigan.gov>
> **To:** "Dillon, Andy (Treasury)" <DillonA2@michigan.gov>, "Stibitz, Brom (Treasury)" <StibitzB@michigan.gov>, "Koryzno, Edward (Treasury)" <KoryznoE@michigan.gov>, "Mike Brown (mbrown@reinvestflint.org)" <mbrown@reinvestflint.org>
> **Cc:** "Hichez, Amy (Treasury)" <HichezA@michigan.gov>, "Cousineau, Sara (Treasury)" <CousineauS@michigan.gov>, "'mmurray@cityofflint.com'" <mmurray@cityofflint.com>
> **Subject: Briefing on Karegnondi Project/City of Flint**
>
> Discussion: Brief Treasury on pros and cons of Karegnondi project. There are concerns about cost and engineering constraints. Report for Flint in late 90's….suggested this project was not financially feasible.
>
> Attendees:
>
> State of Michigan
> Andy Dillon - Treasurer
> Brom Stibitz – Policy Advisor
> Roger Fraser – Deputy Treasurer
> Ed Koryzno – Office of Fiscal Responsibility
>
> City of Flint – (confirmed attendance with Maxine Murray)
> Mike Brown – City Administrator
> Jerry Ambrose, Finance Director
> Howard Croft, Director of Infrastructure & Development
>
> Genesee County – (confirmed attendance with Maxine Murray)
> Jeff Wright, Genesee County Drain Commissioner
> John OBrian, Chief Deputy Drain Commissioner
> Dave Jansen, Assistant Director, Genesee County Drain Commission
> Rick Freeman, Rowe Professional Service
>
> Tucker, Young, Jackson & Tull – (confirmed attendance with David Guastella)
> George Karmo, President
> David Guastella
> Awni Qaqish

Prysby, Mike (DEQ)

From: Bloemker, Jon (DEQ)

Sent: Tuesday, April 10, 2012 1:25 PM

To: Prysby, Mike (DEQ)

Cc: Skinker, Bethel (DEQ); Donaldson, Kristina (DEQ); Shekter Smith, Liane (DEQ); Fisher, Brant (DEQ); Ashford, Stephen (DEQ); Cook, Pat (DEQ); Lee, Lonnie (DEQ); Sleight, Cathy (DEQ)

Subject: Karegnodi Water Authority (Genesee County Drain Commission) Intake Meeting

On April 10, 2012, a meeting was held at the Saginaw Bay District office to discuss the Karegnodi Water Authority's proposed intake into Lake Huron. Present at the meeting representing the Genesee County Drain Commission were John O'Brien, Matthew Raysin, and David Jansen, from Rowe Engineering was James Reddding, the USACOE was Mark Lesinski, and the DEQ were Cathy Sleight and Jon Bloemker.

The Authority is now an incorporated P.A. 233 agency based in Sanilac County. The intake has received a withdraw permit for up to 85 MGD. The authority is proposing to install about one mile of 78-inch line into Lake Huron to about a water depth of 35 feet. The single line will utilize two intakes, each housed in 65 foot diameter octagon, timber cribs. The 78 inch line will be paralleled by a single, 16 inch line acting as a sleeve for three, 4 inch plastic chlorine solution lines. The proposal calls for boring the first 700 to 3,800 feet of the 78 inch line from the west side of M-25 to the east into the lake. The final distance will be opened cut. The length of the bore will be dependent on the soils and the amount of boulders encountered. The bored section of the 78 inch line will be reinforced concrete pipe, and the open cut portion of the line will be either reinforced concrete or steel. The opened cut portion of the line will be bedded with native material and stone. Large stone riprap armor the area above the trench.

The county was warned that typically two intake lines are normally required due to reliability, frazil ice, security and maintenance issues. The county was told that the department would entertain a signed agreement with Detroit and/or Flint to provide back up emergency service in the event of any problems with the single intake line.

The county was informed about the WRD and/or USACOE permitting requirements for construction near the shoreline, a declared beach erosion area and along the lake bottom. The county was told that it would need to contact the DNR regarding the construction season due to spawning and migrations and to obtain a Part 21 easement for the lake bottom construction. There were discussions about spoil disposal, estimated at 35,000 yd^3. A few of the issues surrounding the testing and depositing the spoils in a DMDF and/or upland area were discussed. It was suggested, due the amount of virgin soils, that the county may want to talk to a few of the area's landfills about free or a moderately cost daily cover material. The county was told that side casting the spoils from the dredging back into Lake Huron would be prohibited.

The county and consultant were told that at present the Saginaw Bay District is planning on reviewing the intake, the low lift station and the raw water line to the treatment plant. Also, they were told that the Lansing District would review the treatment plant.

The county hopes to submit its applications in June and start construction in October.

Director - Treasury - Flint

Meeting at O.R 9AM

Tue 3/26/13

HARd to eval cost overruns

2 things Objective for this meeting
- Agree w. Assessment
- Ed study & justify the $$
- Ed the ?s we want to ask
- Put Pros/Cons on table beyond cost

may have to go thru.

Ag. use of KWA - PWSL Hearing Process Possible & Potential for New withdrawal Permit

KWA doubt - $$ cost overruns)

12 Points WRN sees

1. KWA $ ↓ as we are going along
2. Blending not Needed
   - $ costs not needed
   - $ PWSA Health
   - other inputs - NPDES
3. Not exp of Flint - Econ potential
4. 6% impact on DWSD vs 2% if only Flint
5. Why are the 2 orgs ADD-ons ↑ costs - TRP w. KWA options
6. Cost overruns & how it's factored in
7. GLOCom is going regardless

8.

What is QWSD doing to see what step Float Farm Bakery away? Alt note size if not stored now 30 yr contract

CH OTF3 - Ag Power Mkt
- see on table 5
- Could water use/level lag - Kaynes?

Overall
- Ag - Bosmere 2 yrs - working Approx Fa
- Ag - ERR - not Peachtree - Need to current Point if Ag use ire develops could be in the future

Larger scale Question for Thought KWA vs. DWSD

What are the future Rates for Both systems?

* Both are tech. OK to a certain extent (Both overlap some issues) *

Is there enough value gained on keeping that DWSD system together?

What authority do we have? — Powers issued by us

If Flint signs long-term contract w. DWSD who establ. Base-rate? Specifics? Termination Clause?

* We support Regional W-S — there are 2 capacity can't say Adv. of one over the other *

* Why if Lapeer left as off why are G/M rates from WTP not S.G. Lod?

KWA - seems cut-off —
Bland - reasons we can make cut-off - Canton - has left Regional
S.S Finland Sought to keep Regional system?

City of Flint
2011 Needs Survey
Comments/Questions – October 24, 2011

Source, Treatment, Storage, and Pumping Projects

The city retained a Lockwood, Andrews & Newnam (LAN) (Spring 2011) to investigate and determine WTP improvements that will be needed to produce a finished water quality that meets the Michigan safe drinking water standards based upon treatment of the Flint River water on a continuous basis. A draft copy of the investigation report was included with the 2011 Needs Survey. Some of the projects listed in the survey are based on the investigation. Also, the city of Flint completed Phase I of their water system Reliability Study in 2010 that identifies needed water distribution/transmission improvements. Finally, the 2009 DWRF Project Plan – identified similar needs.

Project #

1000 - This project reflects the need to continue making SCADA improvements for Phase II WTP upgrade. The cost estimate is being changed to $720,000 based on LAN's estimate (Page 5 of 12). Also, the design capacity is changed to 28 MGD based on LAN's report.

1001 thru 1006.

Projects 1001-1005 reflect the need to replace the low and high service pumps at P.S. 4 during the 20-year planning period. Project 1006 reflects the need for a pump station to allow the WTP to send treated water to the Dort Reservoir. Projects 1001-1006 will be combined with Project 1012 – Water Treatment Plant Expansion and re-designated as Project 1001 since the low and high service pumps at P.S. 4 are part of the WTP expansion. Also, since the Dort Reservoir will be needed for CT, the new pump station (listed as Project 1006) is considered part of the WTP expansion.

1007 – 1009

These projects reflect the need to replace the booster pumps at P.S. #3 and are carried over from the 2007 survey. MDEQ staff changed Documentation codes #1 and #11 to #20 since these projects rely on the 2007 assessment documentation. MDEQ staff updated the respective project number for each project.

1010 -1011

These projects reflect the need for stand-by power at P.S. #3 and #5 and are carried over from the 2007 survey. MDEQ staff changed Documentation codes #1 and #11 to #20 since these projects rely on the 2007 assessment documentation. MDEQ staff updated the respective project number for each project.

1012 - This project reflects the need for a WTP rehabilitation and is carried over from the 2007 survey. MDEQ staff revised the design capacity to 28 MGD based on LAN's report. Given the scope of the project, staff also renamed the project as a Water Treatment Plant Expansion and combined it with Projects 1001-1006. Docc. Code #11 was changed to Code #2 since an engineer's report is available.

1013 – This project reflects the need replace the electrical switchgear at P.S. No. 3 and is carried over from the 2007 survey. The engineer's cost estimate is provided; thus, this project was not combined with Projects 1007-1009 (replace pumps at P.S. No. 3). MDEQ staff changed Documentation Code #3 to #2 based on the preliminary cost estimate. The project need is also documented in the April 2009 DWRF Project Plan; however, the cost estimate was revised in July 2011 – thus both dates will serve for the cost estimate and supporting documentation.

1014 – This project reflects the need to rehabilitate the Torrey Road PS. MDEQ staff changed Documentation Code #3 to #2 based on the cost estimate. The project need is documented in the April 2009 DWRF Project Plan as a new pump station; however, need has changed to a rehabilitation of the existing station. A copy of the engineer's letter (dated 8/30/2011) explains the reason for the change in need. Since the cost estimate was revised in July 2011 – both dates will serve for the cost estimate and supporting documentation.

1015 – 1016

These projects reflect the need to rehabilitate the Cedar Street and West-side water storage reservoirs within the 20-year planning period. MDEQ staff changed Documentation Code #1 to #20 since these projects rely on the 2007 assessment documentation.

1017 – This project reflects the need to rehabilitate Pump Station #5 within the 20-year planning period. This project is also carried over from the 2007 survey. MDEQ staff changed Documentation Code #1 to # 20 since this project relies on the 2007 assessment documentation.

1018 – This project (rehabilitation of the pumps at P.S. #3) was deleted by MDEQ

staff since Projects 1007 – 1009 provide new pumps at P.S. #3. These pumps cannot be replaced and rehabilitated within the same 20-year planning period.

Transmission & Distribution Projects

2000 - This project reflects the need to replace existing 3 and 4-inch WM with new 8-inch WM and is a carry over from the 2007 survey. MDEQ staff will switch the New code (N) to Replacement code (R). Staff also changed Documentation Code #1 to # 20 since this project relies on the 2007 assessment documentation. Finally, staff revised the cost estimate to $12,000,000 which is consistent with previous documentation.

2001 – This project reflects the need to replace critical 6-inch mains with 8-inch and is carried over from the 2007 survey. MDEQ staff changed the New code (N) to Replacement code (R). Staff also changed Documentation Code #1 to # 20 since this project relies on the 2007 assessment documentation. Finally, the cost estimate was changed to $1,000,000 which is consistent with previous documentation.

2002 – This project reflects the need to loop existing 6-inch WM with 8-inch WM and is carried over from the 2007 survey. This project was deleted by Cadmus in 2007 due to insufficient documentation of the project need at specific locations. MDEQ staff will maintain this project; however, the length of WM will be changed from 3,500 LF to 3,025 LF. The change is based upon Flint's 2009 DWRF Project Plan. The cost estimate was also increased to $470,000 based on the provided estimate. A copy of the looping projects and their cost is provided. Staff also added Documentation #2 based upon the engineer's recommendations.

2003 – This project reflects the need to loop existing 12-inch WM and is carried over from the 2007 survey. This project was deleted by Cadmus in 2007 due to insufficient documentation of the project need at specific locations. MDEQ staff will maintain this project based upon Flint's 2009 DWRF Project Plan. The cost estimate was also increased to $185,000 based on the provided estimate. A copy of the looping projects and their cost is provided. Staff also added Documentation Code #2 based upon the engineer's recommendations.

2004 – 2007

These projects reflect the need to replace existing 6-inch through 16-inch WM and are carried over from the 2007 survey. This project was reduced in scope by Cadmus in the 2007 survey to less than 10% of the total amount of WM replacement in each size category since sufficient independent documentation was not provided.

The 2010 reliability study, the 2009 DWRF Project Plan, and the 6-year CIP identifies WM replacement projects; however, they do not comprise of 10% of the distribution system by size category. MDEQ staff will maintain these projects based on the amount allowed by Cadmus in the 2007 survey. Staff changed Documentation Code #1 to # 20 since these projects rely on the 2007 assessment documentation.

2008 - This project reflects the need to replace 18-inch mains. MDEQ staff changed the length of pipe to 19,800 LF based upon the 2009 DWRF Project Plan. A cost estimate of $7,700,000 was added based on the DWRF preliminary cost estimate (Oct 2011 update). Documentation Code #2 was also added based upon the engineering report and cost estimate.

2009 – This project reflects the need to replace 24-inch mains. MDEQ staff changed the length of pipe to 53,500 LF based upon the 2009 DWRF Project Plan. A cost estimate of $17,500,000 was added based on the DWRF preliminary cost estimate (Oct 2011 update). Documentation Code #2 was also added based upon the engineering report and cost estimate.

2010 – This project reflects the need to replace 30-inch mains. MDEQ staff changed the length of pipe to 5,800 LF based upon the 2009 DWRF Project Plan. A cost estimate of $2,600,000 was added based on the DWRF preliminary cost estimate (Oct 2011 update). Documentation Code #2 was also added based upon the engineering report and cost estimate.

2011 This project reflects the need to replace existing 36-inch mains and is carried over from the 2007 survey. This project was reduced in scope by Cadmus in the 2007 survey to less than 10% of the total amount of WM replacement for that size category since sufficient independent documentation was not provided. Staff changed Documentation Code #1 to # 20 since this project relies on the 2007 assessment documentation.

2012 This project reflects the need to loop existing 8-inch WM and was carried over from the 2007 survey. This project was deleted by Cadmus in 2007 due to insufficient documentation of the project need at specific locations. MDEQ staff will maintain this project based upon Flint's 2009

DWRF Project Plan. The cost estimate was also changed to $6 5,000 based on the provided estimate. A copy of the looping projects and their cost is provided. Staff also added Documentation Code #2 based upon the engineer's recommendations.

2013 – 2014

These projects reflect the need to replace existing 42 and 72-inch WMs and are carried over from the 2007 survey. The scope of these projects were also reduced by Cadmus in the 2007 survey to less than 10% of the total amount of WM replacement in their respective categories since sufficient independent documentation was not provided.

MDEQ staff will maintain these projects; however, the length of WM in each size category will be reduced to the amount allowed by Cadmus in the 2007 survey. Staff will also change Documentation Code #1 to # 20 since this project relies on the 2007 assessment documentation.

Other Projects – Meters, Hydrants, Valves, Etc.

3000 – 3014

These projects reflect the need to continue replacing residential and commercial meters ranging in size from 5/8-in to 24-in and are carried over from the 2007 survey. The number needed in each size category for the 2011 survey is less than the number needed in the 2007 survey since some the meters have been replaced since 2007. MDEQ staff redesignated these projects as a Replacement (R) instead of New (N). Staff also changed Documentation Code #1 to # 20 since these projects rely on the 2007 assessment documentation.

3015 - This project references the need to replace "other commercial meters". MDEQ staff deleted this project since a size was not provided and cannot be modeled by Cadmus.

3016 This project reflects the need to replace lead service lines. This project is not a direct carry over from the 2007 survey since the size and number of services was increased to 1-inch and 18,000 respectively. MDEQ staff re-designated these projects as a Replacement (R) instead of New (N). .

3017 – 3018

These projects reflect the need to replace service lines (1-inch and > 1-inch). MDEQ staff re-designated these projects as a Replacement (R) instead of New (N).

ROWE PROFESSIONAL SERVICES COMPANY

Large Firm Resources. Personal Attention.℠

August 30, 2011

Mr. David Worthington
Michigan Department of Environmental Quality
Constitution Hall.
525 West Allegan.
Lansing, Michigan 48913

Re: City of Flint DWRF
Project Clarification

Dear Mr. Worthington:

Based on the discussions at our meeting regarding the City of Flint's DWRF projects, we are submitting the following project summary for the three projects that have been requested to be included in the FY 2012 PPL.

24-inch Water Main

The 24-inch water main project has not significantly changed since the submittal to the MDEQ and issuance of the construction permit. The project still includes the replacement of the transmission water main from the Water Treatment Plant west to Dupont Street then south to University Avenue.

Although titled "24-inch water main" the project consists of the replacement of water main ranging in sizes from 6-inch to 30-inch with the majority of it being 24-inch diameter.

The replacement of this main transmission main will provide the city with the reliability to provide water to the western and southwestern portions of the city.

Torrey Road Booster Station – scaled down from 4/09 project plan

The Torrey Road Booster Station project has changed scope since the original thought that a total replacement was required. When the project was to be a total replacement, General Motors was considering expansion to their Bristol Road/Van Slyke complex. General Motors was also experiencing low flow conditions within the existing facilities.

Since that time, General Motors has changed their plans for expanding their facilities and also have resolved the low pressure issues by making internal changes. As a result, the total replacement of the Torrey Road Booster Station is not necessary; however, modifications to the existing station are required to provide reliability to the water customers.

The revised project includes replacement of both booster pumps; piping; valves and electrical gear located within the booster station. The structure itself is in adequate condition therefore only the components need to be replaced.

The station houses two booster pumps with only one currently in operation. The city is not able to run the second (larger) pump as it is oversized for the current demand in the system and has caused water main breaks to occur when it has been run the past. By replacing both the pumps and sizing them to meet the current system demand, the system will again have reliability.

In addition, the project includes the addition of a standby generator hookup which will provide the city the ability to move in a portable generator to provide power in times when the main power feed from Consumers Energy is not available. The city currently has an outside contract to provide power to their Water Pollution Control Facilities that will be enhanced to include the water booster stations. A copy of this contract is attached for your reference.

An application was previously submitted to the MDEQ for review and issuance of a construction permit for the revised project but we understand that due to several factors, the application was never acted upon.

Cedar Street

The Cedar Street project has not changed from the original project and the permit issued by the MDEQ. The project still consists of the replacement of the electrical switch gear and the installation of provisions for generator hookup. The age of the existing electrical equipment does not allow the city ease for maintenance. As parts fail, the city has to rebuild rather than ordering new replacement parts.

The provisions for standby generator hookup will provide the reliability that is required for the water system. As mentioned above, the city will modify the outside contract to include Cedar Street.

As discussed, the city is willing to resubmit new construction permit applications for all three of these projects if the MDEQ feels this will provide a clean file. The application can be submitted as one permit for all three projects or we can prepare three individual applications.

We trust that this letter summarizes our discussions at the meeting. If you have any questions, please contact me at (810) 341-7500.

Sincerely,
ROWE Professional Services Company

Jeffrey B. Markstrom, P.E.
Project Manger

Attachment

cc: Brent Wright, City of Flint
Rick Freeman, P.E., Rowe Professional Services Company

R:\sdsk\Proj\08c0157\Doc\Flint DWRF Clarification.docx

Prysby, Mike (DEQ)

From: Busch, Stephen (DEQ)
Sent: Wednesday, March 27, 2013 4:44 PM
To: Prysby, Mike (DEQ)
Subject: FW: ODWMA Response - Flint KWA-DWSD Report
Attachments: KWA - DWSD for WRD.DOCX

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

From: Sygo, Jim (DEQ)
Sent: Wednesday, March 27, 2013 2:53 PM
To: Busch, Stephen (DEQ)
Subject: RE: ODWMA Response - Flint KWA-DWSD Report

Thought I would share with you some items that WRD came up with as well. AS you might guess we are in a situations with Emergency Financial Managers so it's entirely possible that they will be making decisions relative to cost. The concern in either situation is that a compliant supply of source water and drinking water can be supplied.

From: Busch, Stephen (DEQ)
Sent: Wednesday, March 27, 2013 1:39 PM
To: Thelen, Mary Beth (DEQ); Wyant, Dan (DEQ); Sygo, Jim (DEQ); Shekter Smith, Liane (DEQ)
Cc: Willard, Veronica (DEQ); Benzie, Richard (DEQ); Prysby, Mike (DEQ); Bloemker, Jon (DEQ); Donaldson, Kristina (DEQ); Creal, William (DEQ)
Subject: ODWMA Response - Flint KWA-DWSD Report
Importance: High

Director Wyant, and Deputy Director Sygo,

Addendums to ODWMA comments provided yesterday regarding the City of Flint water system and comments on the reports from Tucker, Young, Jackson, Tull, Inc. (TYJT) can be found below in red. Additional comments are as follows:

With regards to regulatory authority for DEQ to allow or prevent the breakup of water utilities, and State vs. local decisions about cost effectiveness, it is important to note that when the DEQ permitted the water withdrawal for KWA (permit 2009-001) part of the decision making process (copy attached) included reasonable use and the balance of Economic Development, Social Development, and Environmental Protection. As part of the public participation process general comments were received (pages 6 & 7) regarding impacts on DWSD and rates to remaining customers. The Department's response to those comments stated:

"The DEQ is specifically precluded from using part 327 to "...diminish or create any existing authority of municipalities to require persons to connect to municipal water supply systems as authorized by law" (MCL 324.32726)."

And

"It is appropriately an issue for water service contract negotiations between the regional water system and its customers. To do otherwise invites unwanted intervention of the state into local decision making."

ODWMA cannot on its own assess an actual dollar value to any regional benefit for the City of Flint to remain a full customer of DWSD, but the following should be included in any additional analysis:

- The cost estimates provided in the TYJT report show a cost difference between full KWA and full DWSD participation of $172 million over 30 years.
- The formation of KWA would itself be considered one of the largest regional drinking water authorities in the State in terms of capacity, and as such any regional benefits provided by DWSD may only be marginal in comparison.

Finally, we have additional questions for TYJT regarding the various DWSD supply options and the considerations they made in the operations of the Flint WTP. These considerations will have an impact on the cost estimates for DWSD options.

We look forward to further discussion of these comments during our meetings tomorrow, and please let us know if you have any additional questions for us between now and then.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

From: Busch, Stephen (DEQ)
Sent: Tuesday, March 26, 2013 3:58 PM
To: Wyant, Dan (DEQ); Thelen, Mary Beth (DEQ); Sygo, Jim (DEQ)
Cc: Willard, Veronica (DEQ); Shekter Smith, Liane (DEQ)
Subject: RE: Flint Draft Response

I will provide additional follow up by tomorrow (Wed.) afternoon to my previous email below based on our discussion and the conference call with Andy Dillon earlier today.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

From: Busch, Stephen (DEQ)
Sent: Tuesday, March 26, 2013 12:37 PM
To: Wyant, Dan (DEQ); Thelen, Mary Beth (DEQ); Sygo, Jim (DEQ)
Cc: Willard, Veronica (DEQ); Shekter Smith, Liane (DEQ)
Subject: Flint Draft Response

Director Wyant,

In preparation for our call today with Treasurer Dillon's office, ODWMA has developed the following for consideration. We can provide any additional info you require during the meeting.

ODWMA has reviewed the materials developed by the consultant Tucker, Young, Jackson, Tull, Inc. (TYJT) for Treasury regarding the City of Flint and potential alternatives for public water supply. Based on our reviews, we have developed the following comments to this point in our analysis:

1. The TYJT report does not contain the full scope of the Karegnondi Water Authority (KWA) raw water supply system. TYJT concerns over raw water supply redundancy and reliability are addressed to the satisfaction of ODWMA under the full KWA proposal. Please note some portions of the overall project are being financed independently by the Genesee County Drain Commission.

2. There are significant differences in contract language between KWA and Detroit Water and Sewerage Department (DWSD) with respect to the contracted maximum day demand capacity.
    a. Under a KWA contract, a "maximum day" capacity of 18 million gallons per day (MGD) would fully satisfy current demands of the City of Flint, without the need to supplement raw water capacity using the Flint River. (18 MGD, average over a 30 day period).
    b. Under a DWSD model contract, a "maximum day" capacity, even at 18 MGD, would not satisfy the current demands for the City of Flint. (18 MGD, over any 24 hour period).

3. Restrictions in contracted capacity that would prevent the City of Flint from meeting peak demand requirements present potential limits to economic development within the City of Flint, including possible connection bans and water system extension bans. This information was previously conveyed to the City of Flint by ODWMA staff.

4. All contract options with DWSD that are considered semi-competitive with the KWA contract do not fully supply the City of Flint, and would require the City of Flint to meet a significant, if not majority, of its water demands by treating water from the Flint River. Continuous use of the Flint River at such demand rates would:
    a. Pose an increased microbial risk to public health (Flint River vs. Lake Huron source water)
    b. Pose an increased risk of disinfection by-product (carcinogen) exposure to public health (Flint River vs. Lake Huron source water)
    c. Trigger additional regulatory requirements under the Michigan Safe Drinking Water Act (LT2ESWTR)
    d. Require significant enhancements to treatment at the Flint WTP, beyond those identified in the TYJT report (see item 5 below).
    e. Water Resource Division is evaluating potential impacts to NPDES wastewater discharge permits in downstream segments of the Flint River, as a result of decreased river baseflow caused by Flint WTP use.

5. The TYJT report does not adequately address increased requirements and costs associated with using the Flint River as a significant source for the Flint WTP, which are not necessary under a Lake Huron source water scenario. This includes:
    a. The need to provide softening treatment
    b. Limitations on disposal options for lime softening sludge
    c. Increased ozone capacity, UV disinfection
    d. Additional backup power, more power required for Flint River operation

6. The Flint WTP must operate at some minimum level and within a range of flow rates to maintain treatment effectiveness. Currently that minimum level is 9 MGD. This level may be reduced with additional capital costs to modify the WTP, not addressed in the TYJT report.

7. Allowing Flint WTP to blend water with DWSD sets a new precedent that could pose future consequences with other DWSD customers.

8. Costs impacts to remaining DWSD customers would be similar under the proposed scenarios, only retaining 8 MGD of 30+ MGD total Flint/Genesee Co. demands, based on the following:
    a. Genesee County distribution system demands are pulling out of DWSD regardless of the decisions by Flint WTP
    b. Flint's need to utilize the Flint River as a source

9. ODWMA anticipates cost savings under the KWA proposal will be leveraged to provide additional improvements to the City of Flint water distribution system, improving efficiency and providing additional cost benefits. The KWA water withdrawal permit (2009-001) includes the required implementation of conservation measures that would also drive these distribution system improvements.

10. Major cost discrepancies in TYJT analysis
    a. Engineering, Legal, Administration, Contingency – TYJT appears to have effectively double charged for these costs in their KWA estimates without adequate justification
    b. Pumping facilities – TYJT cost estimate methodology does not appear to address localized market costs and does not distinguish fixed and variable costs in its comparison analysis.

11. Remaining DWSD customers in Lapeer County could potentially see water quality impacts as a result of Flint joining KWA, if they remain with DWSD. However, indications to ODWMA are that these communities are currently in final negotiations with KWA for service, which would make this a non-issue.
    a. City Lapeer
    b. City of Imlay City

Additional response to the TYJT report has also been provided by Rowe Engineering to Flint EFM, Mr. Ed Kurtz. (Copy Attached)

ODWMA has continued to meet on a regular basis with KWA, Genesee County, and the City of Flint regarding these water supply proposals.

ODWMA will continue to provide any additional detailed analysis requested by Treasury or the DEQ Executive Office.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

Prysby, Mike (DEQ)

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ODWMA cannot on its own assess an actual dollar value to any regional benefit for the City of Flint to remain a full customer of DWSD, but the following should be included in any additional analysis:

- The cost estimates provided in the TYJT report show a cost difference between full KWA and full DWSD participation of $172 million over 30 years.
- The formation of KWA would itself be considered one of the largest regional drinking water authorities in the State in terms of capacity, and as such any regional benefits provided by DWSD may only be marginal in comparison.

Finally, we have additional questions for TYJT regarding the various DWSD supply options and the considerations they made in the operations of the Flint WTP. These considerations will have an impact on the cost estimates for DWSD options.

We look forward to further discussion of these comments during our meetings tomorrow, and please let us know if you have any additional questions for us between now and then.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

From: Busch, Stephen (DEQ)
Sent: Tuesday, March 26, 2013 3:58 PM
To: Wyant, Dan (DEQ); Thelen, Mary Beth (DEQ); Sygo, Jim (DEQ)
Cc: Willard, Veronica (DEQ); Shekter Smith, Liane (DEQ)
Subject: RE: Flint Draft Response

I will provide additional follow up by tomorrow (Wed.) afternoon to my previous email below based on our discussion and the conference call with Andy Dillon earlier today.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

From: Busch, Stephen (DEQ)
Sent: Tuesday, March 26, 2013 12:37 PM
To: Wyant, Dan (DEQ); Thelen, Mary Beth (DEQ); Sygo, Jim (DEQ)
Cc: Willard, Veronica (DEQ); Shekter Smith, Liane (DEQ)
Subject: Flint Draft Response

Director Wyant,

In preparation for our call today with Treasurer Dillon's office, ODWMA has developed the following for consideration. We can provide any additional info you require during the meeting.

ODWMA has reviewed the materials developed by the consultant Tucker, Young, Jackson, Tull, Inc. (TYJT) for Treasury regarding the City of Flint and potential alternatives for public water supply. Based on our reviews, we have developed the following comments to this point in our analysis:

1. The TYJT report does not contain the full scope of the Karegnondi Water Authority (KWA) raw water supply system. TYJT concerns over raw water supply redundancy and reliability are addressed to the satisfaction of ODWMA under the full KWA proposal. Please note some portions of the overall project are being financed independently by the Genesee County Drain Commission.

2. There are significant differences in contract language between KWA and Detroit Water and Sewerage Department (DWSD) with respect to the contracted maximum day demand capacity.
    a. Under a KWA contract, a "maximum day" capacity of 18 million gallons per day (MGD) would fully satisfy current demands of the City of Flint, without the need to supplement raw water capacity using the Flint River. (18 MGD, average over a 30 day period).
    b. Under a DWSD model contract, a "maximum day" capacity, even at 18 MGD, would not satisfy the current demands for the City of Flint. (18 MGD, over any 24 hour period).

3. Restrictions in contracted capacity that would prevent the City of Flint from meeting peak demand requirements present potential limits to economic development within the City of Flint, including possible connection bans and water system extension bans. This information was previously conveyed to the City of Flint by ODWMA staff.

4. All contract options with DWSD that are considered semi-competitive with the KWA contract do not fully supply the City of Flint, and would require the City of Flint to meet a significant, if not majority, of its water demands by treating water from the Flint River. Continuous use of the Flint River at such demand rates would:
    a. Pose an increased microbial risk to public health (Flint River vs. Lake Huron source water)
    b. Pose an increased risk of disinfection by-product (carcinogen) exposure to public health (Flint River vs. Lake Huron source water)
    c. Trigger additional regulatory requirements under the Michigan Safe Drinking Water Act (LT2ESWTR)
    d. Require significant enhancements to treatment at the Flint WTP, beyond those identified in the TYJT report (see item 5 below).
    e. Water Resource Division is evaluating potential impacts to NPDES wastewater discharge permits in downstream segments of the Flint River, as a result of decreased river baseflow caused by Flint WTP use.

5. The TYJT report does not adequately address increased requirements and costs associated with using the Flint River as a significant source for the Flint WTP, which are not necessary under a Lake Huron source water scenario. This includes:
    a. The need to provide softening treatment
    b. Limitations on disposal options for lime softening sludge
    c. Increased ozone capacity, UV disinfection
    d. Additional backup power, more power required for Flint River operation

6. The Flint WTP must operate at some minimum level and within a range of flow rates to maintain treatment effectiveness. Currently that minimum level is 9 MGD. This level may be reduced with additional capital costs to modify the WTP, not addressed in the TYJT report.

7. Allowing Flint WTP to blend water with DWSD sets a new precedent that could pose future consequences with other DWSD customers.

8. Costs impacts to remaining DWSD customers would be similar under the proposed scenarios, only retaining 8 MGD of 30+ MGD total Flint/Genesee Co. demands, based on the following:
    a. Genesee County distribution system demands are pulling out of DWSD regardless of the decisions by Flint WTP
    b. Flint's need to utilize the Flint River as a source

9. ODWMA anticipates cost savings under the KWA proposal will be leveraged to provide additional improvements to the City of Flint water distribution system, improving efficiency and providing additional cost benefits. The KWA water withdrawal permit (2009-001) includes the required implementation of conservation measures that would also drive these distribution system improvements.

10. Major cost discrepancies in TYJT analysis
    a. Engineering, Legal, Administration, Contingency – TYJT appears to have effectively double charged for these costs in their KWA estimates without adequate justification
    b. Pumping facilities – TYJT cost estimate methodology does not appear to address localized market costs and does not distinguish fixed and variable costs in its comparison analysis.

11. Remaining DWSD customers in Lapeer County could potentially see water quality impacts as a result of Flint joining KWA, if they remain with DWSD. However, indications to ODWMA are that these communities are currently in final negotiations with KWA for service, which would make this a non-issue.
    a. City Lapeer
    b. City of Imlay City

Additional response to the TYJT report has also been provided by Rowe Engineering to Flint EFM, Mr. Ed Kurtz. (Copy Attached)

ODWMA has continued to meet on a regular basis with KWA, Genesee County, and the City of Flint regarding these water supply proposals.

ODWMA will continue to provide any additional detailed analysis requested by Treasury or the DEQ Executive Office.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

EMERGENCY MANAGER
CITY OF FLINT
GENESEE COUNTY MICHIGAN

ORDER No. 31

WATER AND SEWER RATE INCREASES

BY THE POWER AND AUTHORITY VESTED IN THE EMERGENCY MANAGER ("EMERGENCY MANAGER) FOR THE CITY OF FLINT, MICHIGAN ("CITY") PURSUANT TO MICHIGAN'S PUBLIC ACT 4 OF 2011, THE LOCAL GOVERNMENT AND SCHOOL DISTRICT FISCAL ACCOUNTABILITY ACT, ("PA 4"); MICHAEL BROWN, THE EMERGENCY MANAGER, ISSUES THE FOLLOWING ORDER:

On March 16, 2011, the Local Government and School District Fiscal Accountability Act, Public Act 4 of 2011, ("Public Act 4") was enacted to safeguard and assure the fiscal accountability of units of local government; to preserve the capacity of units of local government to provide or cause to be provided necessary services essential to the public health, safety and welfare of citizens; and

Governor Rick Snyder appointed Michael Brown as the Emergency Manager for the City of Flint on November 28, 2011, and his contract was approved by the State Treasurer on November 29, 2011; and

Pursuant to Public Act 4, the Emergency Manager has broad powers in receivership to rectify the financial emergency and to assure the fiscal accountability of the City of Flint and its capacity to provide or cause to be provided necessary services essential to the public health, safety and welfare; and

Pursuant to Public Act 4, the Emergency Manager acts in place of local officials, specifically the Mayor and City Council, unless the Emergency Manager delegates specific authority; and

Pursuant to Public Act 4, the Emergency Manager may take any action or exercise any power or authority of any officer, employee, department, board, commission, other similar entity of local government, whether elected or appointed, relating to the operation of local government.

Under state law the City has an obligation to set water and sewer rates that are sufficient to cover the costs of operating the water and sewer systems. See MCL 141.121.

The City of Flint determined that it was necessary to raise water and sewer rates, effective September 16, 2011, to adequately cover the system costs and comply with state law. And because the September 16, 2011 rate increases are insufficient to cover the costs of operating the water and sewer systems and pay outstanding bonded indebtedness on the water system, it is necessary to raise rates again, effective July 1, 2012.

Both the September 16, 2011 rates increases and the July 1, 2012 rate increases are necessary to comply with state law. Without the rate increases, the City would run a deficit in both the water and sewer funds.

It is hereby ordered:

The September 16, 2011 rate increases are expressly ratified and confirmed as of September 16, 2011.

Water and sewer rates are revised, effective July 1, 2012, as shown on the attached rate schedules.

Any local ordinance or regulation that is inconsistent with or limits the City's ability to comply with its obligation under state law to charge water and sewer rates that cover the costs of operating the systems and pay bonded debt are invalid, effective September 16, 2011.

This Order shall have immediate effect and is for immediate publication.

This Order may be amended, modified, repealed or terminated by any subsequent order issued by the Emergency Manager.

Dated: May 30, 2012

By: Michael K Brown
Michael K. Brown
Emergency Manager
City of Flint

xc: State of Michigan Department of Treasury
Mayor Dayne Walling
Flint City Council
Inez Brown, City Clerk

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SCHEDULE OF WATER RATES & CHARGES
EFFECTIVE FOR BILLS DUE AFTER July 1, 2012

WATER CONSUMPTION RATES

Metered Water

Rates per 100 cubic feet (ccf)	Rates Effective September 16, 2011		Rates For Bills Due After July 1, 2012	
	Inside City Rate	Outside City Rate	Inside City Rate	Outside City Rate
Through 35 ccf	6.683	10.008	7.518	11.259
Next 1,965 ccf	6.498	9.569	7.310	10.765
Over 2,000 ccf	5.148	7.713	5.792	8.677

WATER MONTHLY SERVICE CHARGES

Remote Meter Monthly Charge

Meter Size	Rates Effective September 16, 2011		Rates For Bills Due After July 1, 2012	
	Inside City Charge	Outside City Charge	Inside City Charge	Outside City Charge
5/8"	19.356	28.874	21.776	32.483
3/4"	37.210	55.739	41.861	62.706
1"	49.140	73.593	55.283	82.792
1-1/2"	49.140	73.593	55.283	82.792
2"	49.140	73.593	55.283	82.792

Non-Remote Meter Monthly Charge

Meter Size	Rates Effective September 16, 2011		Rates For Bills Due After July 1, 2012	
	Inside City Charge	Outside City Charge	Inside City Charge	Outside City Charge
5/8"	23.406	35.269	26.332	39.676
3/4"	41.479	62.201	46.664	69.976
1"	53.291	80.055	59.952	90.062
1-1/2"	53.291	80.055	59.952	90.062
2"	53.291	80.055	59.952	90.062

Commercial & Industrial Monthly Charge

Meter Size	Rates Effective September 16, 2011		Rates For Bills Due After July 1, 2012	
	Inside City Charge	Outside City Charge	Inside City Charge	Outside City Charge
5/8"	47.453	71.230	53.385	80.134
3/4"	54.456	81.524	61.263	91.715
1"	66.758	100.154	75.103	112.673
1-1/2"	95.783	143.809	107.756	161.785
2"	133.886	200.965	150.622	226.086
3"	264.398	398.639	297.448	448.469
4"	465.329	698.103	523.495	785.366
6"	915.048	1,372.326	1,029.429	1,543.867
8"	1,327.000	1,990.643	1,492.875	2,239.473
10"	1,831.781	2,762.201	2,060.754	3,107.476
12"	2,216.110	3,324.004	2,493.124	3,739.505
16"	2,757.899	4,136.771	3,102.636	4,653.867
20"	2,978.829	4,856.726	3,351.183	5,463.817

SCHEDULE OF SEWER RATES & CHARGES
EFFECTIVE FOR BILLS DUE AFTER July 1, 2012

SEWAGE FLOW RATES

Residential Sewage Flow Rates	Rates Effective September 16, 2011		Rates For Bills Due After July 1, 2012	
	Inside City Rate	Outside City Rate	Inside City Rate	Outside City Rate
Rate per 100 cubic feet (ccf) (Based upon metered water)	3.310	3.645	4.800	5.285

Commercial & Industrial Waste Rates	Rates Effective September 16, 2011		Rates For Bills Due After July 1, 2012	
	Inside City Rate	Outside City Rate	Inside City Rate	Outside City Rate
Volume (per 100 cubic feet)	1.238	1.404	1.795	2.036
Suspended Solids (per pound)	0.379	0.378	0.550	0.548
Biological/Chemical Oxygen Demand (per pound)	0.606	0.905	1.169	1.312
Phosphorus (per pound)	1.143	1.161	1.657	1.683
Industrial Charge (per 100 cubic feet)	0.021	0.021	0.030	0.030

Wholesale Rates				
Beecher Metro District Rate		1.335		1.335

SEWER MONTHLY SERVICE CHARGE

Residential - Remote Read Meter Charge

	Rates Effective September 16, 2011		Rates For Bills Due After July 1, 2012	
Meter Size	Inside City Charge	Outside City Charge	Inside City Charge	Outside City Charge
5/8"	22.070	28.283	32.002	41.010
3/4"	32.360	38.624	46.922	56.005
1"	45.062	54.473	65.340	78.986
1-1/2"	45.062	54.473	65.340	78.986
2"	45.062	54.473	65.340	78.986

Residential Non-Remote Meter Charge

	Rates Effective September 16, 2011		Rates For Bills Due After July 1, 2012	
Meter Size	Inside City Charge	Outside City Charge	Inside City Charge	Outside City Charge
5/8"	24.227	30.348	35.129	44.005
3/4"	34.537	40.811	50.079	59.176
1"	47.137	56.606	68.349	82.079
1-1/2"	47.137	56.606	68.349	82.079
2"	47.137	56.606	68.349	82.079

Commercial & Industrial Charge

	Rates Effective September 16, 2011		Rates For Bills Due After July 1, 2012	
Meter Size	Inside City Charge	Outside City Charge	Inside City Charge	Outside City Charge
5/8"	35.806	40.082	51.919	58.119
3/4"	44.437	50.774	64.434	73.622
1"	58.419	67.622	84.708	96.052
1-1/2"	95.064	113.657	137.843	164.803
2"	135.285	160.299	196.163	232.434
3"	302.126	360.599	438.083	522.869
4"	497.822	610.349	721.842	885.006
6"	1006.861	1220.778	1459.948	1770.128
8"	1481.526	1825.187	2148.213	2646.521
10"	2012.684	2429.339	2918.392	3522.542
12"	2362.919	2850.120	3426.233	4132.674
16"	3119.962	3791.664	4523.945	5497.913
20"	3673.700	4504.842	5326.865	6532.021

Prysby, Mike (DEQ)

From: Crooks, Jennifer <crooks.jennifer@epa.gov>
Sent: Tuesday, March 31, 2015 3:31 PM
To: Prysby, Mike (DEQ); Busch, Stephen (DEQ)
Cc: Poy, Thomas; Bair, Rita; Damato, Nicholas; Murphy, Thomas; Shoven, Heather; Kuefler, Janet; Deltoral, Miguel
Subject: Call with EPA-Cincinnati, Office of Research and Development

Mike—below are the notes from the call we had last week regarding Legionella, as we discussed. You also mentioned that I should remind you to:

1. check with Mike Glasgow at Flint to ask about their flushing strategy; what types of flushing they are conducting; and
2. that you will send me the March MOR when you receive it in April. (Kris Donaldson from Warren office sent me the March 2014 MOR for Flint w/Detroit water.)

Both of these items above were discussed by Darren Lytle; that these documents will provide him basic data about the Flint water system.

Thank you!

Jennifer

Summary:
Last Thursday, March 26, we talked with Darren Lytle, Acting Chief of the Treatment Technology Evaluation Branch at EPA-Cincinnati, Office of Research and Development. Also in attendance was Simoni Triantafyllidou, a post-doctoral fellow working with Darren. Tom Poy, Nick Damato, Janet Kuefler, Miguel, and Jennifer were also in attendance.

Tom Poy summarized for Darren and Simoni what has occurred with the Flint drinking water since April 2014 when the change over from Detroit to Flint River water occurred, including the violations Flint has incurred since then. Miguel said that we don't know if Flint has a lead problem at this time. Due to findings by Genessee County Health Dept. that there has been an increase in the incidence of Legionella since April 2014, Genessee CHD has FOIA'd the City of Flint for operational data.

Darren talked about several treatments they have done for Legionella in 2 hospitals. The first treatment used copper/silver ions for disinfection. They did sampling at 10 locations, took water quality parameters and took microbiological samples. But they shut down the treatment due to staining of toilets on the cold water side. They did turn the treatment back on, only on the hot water side. The second treatment is a monochloramine system in the hot water feed, but the secondary effects are nitrification.

Darren said they have been doing studies for Homeland Security, collecting sediments at the bottom of storage tanks. He is finding high concentrations of Legionella in the bottom of the tanks.

Darren said anytime there is a treatment change, issues arise with the drinking water quality. Thus, what does this do to the transport of organisms like Legionella? Does is cause organisms to desorb and go into solution? The changes in water chemistry change these organisms electrostatically, and the biofilms with the distribution system pipes are disrupted and de-stabilize. Thus, different contaminants can be released. So maybe this isn't happening in people's homes; but it is happening in the distribution system pipes.

Darren thought that the incidence of Legionella must be fairly extensive for the CHD to notice and study.

We talked about the pathogen, Legionella. Simoni said that Legionella is everywhere; it is a group of opportunistic pathogens; meaning that it looks for high risk/immunocompromised hosts to infect. It may infect others but not show signs of disease because their immune system is working properly. Simoni was interested in knowing where are these cases of Legionella occurring? The background information/data is important in a study of the incidence of Legionella. Jen said she would gather data from past use of Detroit water (March 2014 monthly operation report-MOR), and recent MORs from use of Flint River water, and TTHM levels since April 2014. Tom Poy said that the Dept of Community Health is communicating with the Genessee CHD regarding their findings on Legionella.

Miguel said that extensive flushing is going on in Flint to address stagnant water that fosters bacti problems and TTHM development. But, stirring up the distribution system lines with flushing is stirring up the sediment in the pipes, and then causes a large chlorine demand, thus decreasing the chlorine residual which could promote the growth of bacteria, such as Legionella. Chlorine residual will come back gradually, though. Jen said she would check in with the State to find out the details of Flint's flushing program; is it unidirectional for example?

Darren asked, How can we help? He offered to conduct sampling and analyses for Legionella when it is needed. Tom Poy said the State is currently figuring out a communication-with-the-public plan. Mike Wright is the HQ-ORD DDBP expert and he is helping with the TTHM health effects issue. Tom Poy said that we are laying a foundation now with resources for when the State goes public with the issue of Legionella. Darren said that the labs are set-up now ready for Legionella sampling and analyses. Mark Rodgers is the Chief of the Microbial Contamination Branch at EPA-Cincinnati, ORD.

Darren is doing a RARE project in Region 3 on Legionella. EPA could work on the DNA to determine if the Legionella infecting people is from the distribution system. Type 1 Legionella causes disease, but other forms of Legionella do not cause disease. But Darren said, we must identify the source of the Legionella first.

Miguel said that we must look at the overall picture, i.e. is the system causing this increased incidence of Legionella disease? Darren said that first, we must find the source—is Legionella there? If Legionella is present, in the tanks/pipes, then disturbance of changing the water quality and flushing, could cause it to proliferate.

END

Prysby, Mike (DEQ)

From: John O'Malia <jcomalia@gmail.com>
Sent: Tuesday, January 22, 2013 10:48 AM
To: Prysby, Mike (DEQ)
Cc: David Jansen; Elgar Brown
Subject: Re: KWA meeting

Thanks Mike and you are correct Wed meeting at 1:30PM your office. John and Dave plus Elgar.
The agenda is to meet Steve, generally go over the project i.e. KWA report dated 2009, discuss who is in and who maybe out, current status interms of the intake bidding, preparation of preliminary design by Wade Trim, projected timeline for letting more engineering design contracts, projected start up of the project and financing (bonding) update. Important to discuss the current status of Flint City and DWSD as well.
Probaly take several hours. It would be a good idea to set a time for Steve to come to the GCDC office and sit in on a preliminary design meeting with WT etal to get a feel for the final preliminary design criteria and to seek MDEQ input. Suggest that both you and Jon be in attendance. Early Feb. probaly best to really kick off the design. We can set the meeting Wed. To insure all on board.
Any questions let me know and we look forward to the meeting. We will ask for you at 1:30.
John O'

On Tuesday, January 22, 2013, Prysby, Mike (DEQ) wrote:

I am confirming the KWA meeting here in Lansing tomorrow at 1:30pm, please forward any agenda items that you wish to discuss. Thanks.

Michael Prysby, P.E.

District Engineer

Office of Drinking Water and Municipal Assistance

517 335-6122

Dept of Environmental
9/15 — DCH/ DEH of Health
Debbie Hargrove
Linda [redacted] 335-8566

— Comm. Coll Owners Folks — ↑ to L
pass assn to OW source

SCHO concerns w/ DCH/ elevated metals
& asking DCH to formally CDC in on this

— DEQ has reg. jurisdiction
— CDC only steps in when invited by DEQ
— we are here if we need technical assistance

& not pursue what's going w. SCHO
only exception of time — we only awake

→ we could not step into SHA w. CDC
& by-pass DEQ

& Q from ATSDR
Mark Johnston — Soil. Physi.
agency with CDC → got contact from EPA Reg. 5
Q
someone in Sci w/ L concern/ow qual

- Some Ps to then back to COH
- to clear out data/accuracy
- Std. of Poster within Mingy system

Egress Assessment

Plumbing Profile (Pg 17)

For developing 1.5% of Assigned author

IO Sample sites
- Low Fountains
- Kitchen sinks
- Hose bibb sinks
- Janitor/office sinks/bathroom
- Special Rooms
- Rooms w/ heat exchanging condenser (Coolers)

Plumbing Public Records Exhibit 3.1 (1-17) Pgs 18-23

- Is the bldg connected to ?
- Replace A. BC, was IB materials & solder used?
- Location/Date of Most recent repairs?
- Service line Materials & location of bldg only
- Type of Public bldg Pipe
  - IB, Plastic, GAL, CE, copper, other
  - Plan Dia - First/last
- Storage (Pressure/Gravity)? - Pressure, Date?
- Pump Station vs. Facilities
- Booster Pumping/Access/Valves → Map or diagram

Sample
1 concern
1 per ID
1
Carpet

Assume
100 trips/school
4 Samples/trip — 4 mc samples
400 samples
x15 schools
6000

- Outlets for Sanitation Facilities (Accessible Screened Cleaned ?) or Ref Plumbing Profile
  - Cooler
  - Boiler
  - Ice Maker
  - Ice Flaps
  - Dw Fountain / Tap
  - (or Ref Plumbing P&ID Printed drwgs)
- Coolers — Verify cleaned coolers (App. E of 3.7 Annex Q)
- Signs of Corrosion ? (Pg leaks, Rust water, Stains)
- Electrical Grounding + Plumbing (Other ?)
- WR Cupboards (Metallic Table, Entry)
- Records of WQ From Bldg
  - Condemn, Conc, pH, Reg. Testing ?
- Other Plumbing Records (Make to Public ?)
  - As Builts
  - Problem areas (Bleed Lines, Stag. Leaks)
  - Renovations / Mods

DTM Sampling Locations

Cooling Towers → Main → 052-6154 Painted cutlet

Ref Questionnaire → Area Location
Recent Cond/Repairs w PB
Grading
Stg Area
Brass Fittings
Bad Coolers

Number Diagram

Who collects ↔ Adequately trained / understand protocol
Cert Lab — Turnaround time ?

Sample Collection

- Similar vol 0.35L — Must fill all cans except 4 legs similar sect of Pudg
- 3-18 Hr Stg / collect Beg to End use
- If ≥ 18 Hrs Type of Pond (use / often) → use the longer Stg
- Don't collect after Treatment / Cooler Cycle / Outage
- Sample Log → each sample location
  - Type (1st Draw, Flush, Time Series)
  - Date/Time
  - Location
  - Outlet info / map

2-Step Monitoring

& time series
→ 1, 5, & 10 min

1). Sample Priority-0 outlets first draw
- Sample tap nearest to source line – flushed sample
- Verify chlorine level

→ Initial (Mg)

→ 30 sec

→ Repeat

2. Follow-up Risk Sampling ← (Several possible)
IF Initial ≥ 20 MB for a Prioritized outlet
- Sample take shorter span between first use
- Collect Follow-up A: 30 sec flush

Alt to Step 2
Check aerator & clean if necessary
Resample with Initial Protocol
IF results ≥ 500 – assume dirty aerator
IF both ≥ 20-25 MB – problem upstream of aerator → follow-up non
IF result was 6 then 20-25 – both dirty aerators & problem upstream
↳ Step 2 follow-up non

→ RAP Exhibits 4.3-4.8 for specific sampling instructions for type of outlets

All in types of outlets from Pg 5

- Service Connections/Mains
- DW Fountains
  - Bubblers vs. Chillers - Ref Ex 9.4
  - Bubbler/Fountain w. Control chiller - Pg 52
  - Coolers - a cooling & storage unit - Ex 4.5
  - Bottled H2O dispenser - Ex 4.6
- Ice makers - Ex 4.7
- Water Faucets - Ex 4.8
- Interior Plumbing - Consult w/ Plumber/ outlets (follow-up) > 20 PSI

Bathroom & Kitchen Fixtures

Interior Plumbing

Laterals - use actual designed as sample site for lateral pipe
Headers - use sampling pt farthest from Riser Pipe
Riser Pipes - use tap closest to riser pipe

DANIEL T. KILDEE
5TH DISTRICT, MICHIGAN

COMMITTEE ON
FINANCIAL SERVICES

SUBCOMMITTEE ON
HOUSING AND INSURANCE

SUBCOMMITTEE ON
MONETARY POLICY AND TRADE

SENIOR WHIP

DEMOCRATIC POLICY AND
COMMUNICATIONS COMMITTEE

Congress of the United States
House of Representatives
Washington, DC 20515

September 9, 2015

WASHINGTON OFFICE

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DEPT. OF ENVIRONMENTAL QUALITY
OD/MA-FOS
SEP 15 2015
RECEIVED

Ms. Gina McCarthy
Administrator
Environmental Protection Agency
1200 Pennsylvania Ave. NW
Washington, D.C. 20460

Mr. Dan Wyant
Director
Michigan Department of Environmental Quality
P.O. Box 30473
Lansing, MI 48909

Administrator McCarthy and Director Wyant:

The attached June 24, 2015, memorandum between two Environmental Protection Agency (EPA) employees, Miguel A. Del Toral and Thomas Poy, published recently by the American Civil Liberties Union of Michigan, suggests that there are high lead levels in the city of Flint, Mich., water traces

- Are the findings in the memorandum regarding the lead levels in the city of Flint water accurate?
- If there were in fact high levels of lead in the water in the city of Flint, when did the EPA and/or MDEQ plan to alert the public?
- What, if any, of the recommendations has the EPA followed from the memorandum?
- Given the demonstrated level of lead in the water in Flint, MI, is the water safe?

Regardless, I am very troubled by recent tests suggesting high levels of lead in the city of Flint's water system. As you know, on the EPA's website it says that lead above the "action level" in drinking water can cause a variety of adverse health effects, including delays in physical and mental development in babies and children.

According to the Safe Drinking Water Act, the EPA has the responsibility of enforcing water quality standards. EPA, however, has given the primary responsibility of enforcing water quality standards to the state of Michigan via MDEQ. As such, it is the responsibility of these agencies to ensure that the people of the city of Flint have safe drinking water.

Thank you and I look forward to hearing from you soon.

Sincerely,

Dan Kildee
MEMBER OF CONGRESS

cc:

State Senator Jim Ananich
State Representative Sheldon Neeley
State Representative Phil Phelps
Mayor Dayne Walling, City of Flint
Howard Croft, City of Flint
Susan Hedman, EPA
Thomas Poy, EPA
Michael Schock, EPA-ORD
Darren Lytle, EPA-ORD
Denise Fortin, EPA
Liane Shekter-Smith, MDEQ
Pat Cook, MDEQ
Stephen Busch, MDEQ
Brad Wurfel, MDEQ
Marc Edwards, Virginia Tech

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

WG-15J

June 24, 2015

MEMORANDUM

SUBJECT: High Lead Levels in Flint, Michigan – Interim Report

FROM: Miguel A. Del Toral
Regulations Manager, Ground Water and Drinking Water Branch

TO: Thomas Poy
Chief, Ground Water and Drinking Water Branch

The purpose of this interim report is to summarize the available information regarding activities conducted to date in response to high lead levels in drinking water reported by a resident in the City of Flint, Michigan. The final report will be submitted once additional analyses have been completed on pipe and water samples.

Following a change in the water source, the City of Flint has experienced a number of water quality issues resulting in violations of National Primary Drinking Water Regulations (NPDWR) including acute and non-acute Coliform Maximum Contaminant Level (MCL) violations and Total Trihalomethanes (TTHM) MCL violations as follows:

Acute Coliform MCL violation in August 2014
Monthly Coliform MCL violation in August 2014
Monthly Coliform MCL violation in September 2014
Average TTHM MCL violation in December 2014
Average TTHM MCL violation in June 2015

In addition, as of April 30, 2014, when the City of Flint switched from purchasing finished water from the City of Detroit to using the Flint River as their new water source, the City of Flint is no longer providing corrosion control treatment for lead and copper.

A major concern from a public health standpoint is the absence of corrosion control treatment in the City of Flint for mitigating lead and copper levels in the drinking water. Recent drinking water sample results indicate the presence of high lead results

in the drinking water, which is to be expected in a public water system that is not providing corrosion control treatment. The lack of any mitigating treatment for lead is of serious concern for residents that live in homes with lead service lines or partial lead service lines, which are common throughout the City of Flint.

In addition, following the switch to using the Flint River, the City of Flint began adding ferric chloride, a coagulant used to improve the removal of organic matter, as part of the strategy to reduce the TTHM levels. Studies have shown that an increase in the chloride-to-sulfate mass ratio in the water can adversely affect lead levels by increasing the galvanic corrosion of lead in the plumbing network.

Prior to April 30, 2014, the City of Flint purchased finished water from the City of Detroit which contained orthophosphate, a treatment chemical used to control lead and copper levels in the drinking water. When the City of Flint switched to the Flint River as their water source on April 30, 2014, the orthophosphate treatment for lead and copper control was not continued. In effect, the City of Flint stopped providing treatment used to mitigate lead and copper levels in the water. In accordance with the Lead and Copper Rule (LCR), all large systems (serving greater than 50,000 persons) are required to install and maintain corrosion control treatment for lead and copper. In the absence of any corrosion control treatment, lead levels in drinking water can be expected to increase.

The lack of mitigating treatment is especially concerning as the high lead levels will likely not be reflected in the City of Flint's compliance samples due to the sampling procedures used by the City of Flint for collecting compliance samples. The instructions from the City of Flint to residents direct the residents to 'pre-flush' the taps prior to collecting the compliance samples. A copy of the instructions provided by the City of Flint to residents will be included in the final report.

The practice of pre-flushing before collecting compliance samples has been shown to result in the minimization of lead capture and significant underestimation of lead levels in the drinking water. Although this practice is not specifically prohibited by the LCR, it negates the intent of the rule to collect compliance samples under 'worst-case' conditions, which is necessary for statistical validity given the small number of samples collected for lead and copper under the LCR. This is a serious concern as the compliance sampling results which are reported by the City of Flint to residents could provide a false sense of security to the residents of Flint regarding lead levels in the water and may result in residents not taking necessary precautions to protect their families from lead in the drinking water. Our concern regarding the inclusion of 'pre-flushing' in sampling instructions used by public water systems in Michigan has been raised with the Michigan Department of Environmental Quality (MDEQ). The MDEQ has indicated that this practice is not prohibited by the LCR and continues to retain the 'pre-flushing' recommendation in their lead compliance sampling guidance to public water systems in Michigan. A copy of the MDEQ guidance will be included in the final report.

In the case of the Flint resident that contacted U.S. EPA (Ms. Lee-Anne Walters), the initial results from drinking water samples collected by the City of Flint in her home

for lead were 104 ug/L and 397 ug/L. The level of iron in the water also exceeded the capability of the measurement (>3.3 mg/L). The lead results were especially alarming given that the samples were collected using the sampling procedures described above, which minimize the capture of lead. When contacted by U.S. EPA Region 5, the MDEQ indicated that the lead was coming from the Walters' plumbing. Ms. Walters had previously indicated that all of the plumbing in the home was plastic.

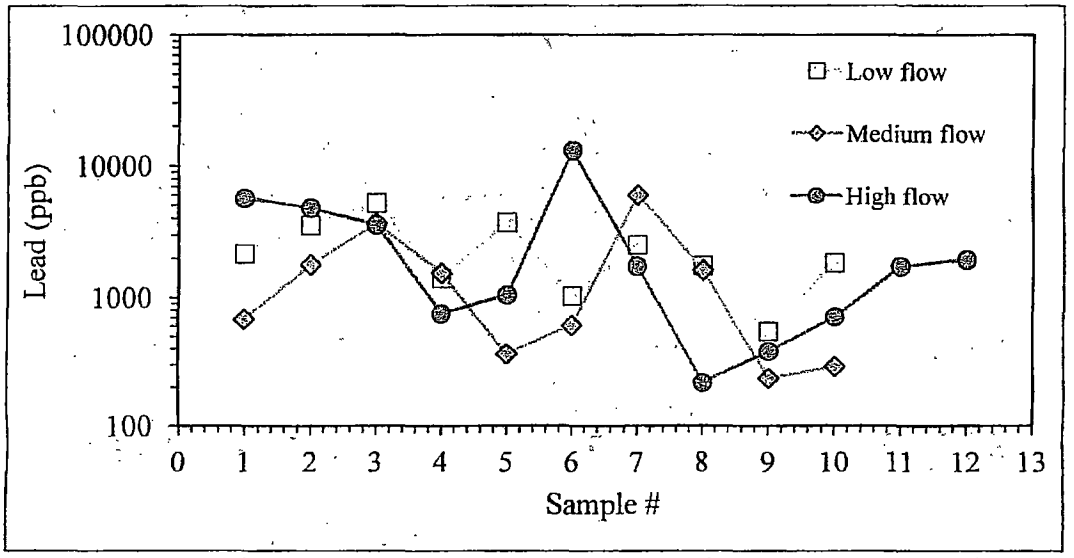
Following the confirmation of the initial high lead results, U.S. EPA Region 5 conducted two visits to the Walters' home on April 27, 2015 and May 6, 2015. Based on an inspection of the plumbing and subsequent sampling conducted at the Walters' residence, it was determined that except for a few minor metallic connectors, all interior plumbing, including the pipes, valves and connectors are made of plastic certified by the National Sanitation Foundation (NSF) for use in drinking water applications. Subsequent sampling showed that the faucets in the home appear to be compliant with the new lead-free requirements and are also not the source for the high lead levels. Our inspection of the interior plumbing and analysis of follow-up sampling results demonstrate that the home plumbing network is not the source of the high lead levels found at the Walters' residence. The photographs and all sampling results will be included in the final report.

Based on the U.S. EPA inspection and documentation of the plastic plumbing at the Walters' residence, it was suspected that the high lead was being introduced into the Walters' home plumbing from outside the home, likely from a lead service line. Three portions of the service line were extracted during a subsequent trip on May 6, 2015 and sent for analysis, when the Walters' service line was replaced. Analyses performed to date indicate that a portion of the service line is made of galvanized iron pipe. Inspection of the remaining portion from the water main to the external shut-off valve confirmed that the portion from the water main to the external shut-off valve is a lead service line.

Ms. Walters has also provided U.S. EPA with medical reports on her child's blood lead testing indicating that the child had a low blood lead level (2 ug/dL) prior to the source water switch and an elevated blood lead level following the switch (6.5 ug/dL). Redacted copies of these reports will also be included in the final report.

Subsequent to the discovery of high lead levels in the Walters' drinking water, the water to the Walters' home was shut off on April 3, 2015. The water was briefly turned back on to collect additional samples on April 28, 2015. Since the water had stagnated for an extended period of time, the kitchen tap was flushed for 25 minutes the night before collecting the samples. Three sets of samples were collected at different flow rates (10 at low flow, 10 at medium flow and 10 at high flow).

The drinking water samples collected from the Walters' residence on April 28, 2015 contained extremely high lead levels, ranging in value from 200 ug/L to 13,200 ug/L (see below).



Sample results and graph are provided courtesy of Virginia Tech

Additional sample results from resident-requested samples have also shown lead levels in excess of the lead action level. As with the samples collected by the City of Flint for compliance, the resident-requested samples are also being collected using the 'pre-flushing', so the lead levels captured in these samples likely do not represent the worst-case lead levels in the water and the actual lead levels at these homes may be much higher.

Pending completion of the final report, my interim recommendations are as follows:

1. The U.S. EPA should follow up with the MDEQ and the City of Flint on the recommendation made by U.S. EPA to MDEQ on June 10, 2015 to offer the City of Flint technical assistance on managing the different water quality issues in Flint, including lead in the drinking water. Although there have been two written assessments regarding water quality and operational issues in Flint at the time of this report, they do not address lead in drinking water. The first is an Operational Evaluation Report (OER) produced in November 2014 by Lockwood, Andrews and Newnam, Inc. to assess the factors contributing to high Total Trihalomethane (TTHM) levels in Flint following the source change. The focus of this report is to identify potential causes and remedial actions for lowering TTHM levels. The second report (Water Quality Report) produced by Veolia for the City of Flint on March 12, 2015, is an assessment of Flint's water quality and operations which provides advice to the City of Flint primarily focused on TTHM control and other operational issues. Both reports were written prior to the recent discovery of high lead results in Flint drinking water. As such, the reports do not take into account the potential effects on lead levels in drinking water.

As previously mentioned, the City of Flint currently has no mitigating

Concept ①

- ID sample sites → Plumbing Profile
  Pg 17 EPA – "Prioritized outlets"

+ other Potential Sites
  Bosque, Corrosion Study, grounding, equipment
  WQ Records (analytical), plumbing records

Pg 84

Ref Exh. 33/34 Pgs 26-27 ?

Pg 28

- Sample collection Procedures
  - Volume .95L
  - Stagnation 8-18 HRS 10-16°F 0.5/1.5/10 min
  - Sample ID # – Unique for each location
  - •
    - type – 1st draw / Follow-up / Time Series
    - Date/Time
    - Collector
    - Location
    - outlet info/ maint

2 Step Monitoring →

condensed (2)

1) Initial Monitoring @ Inverted outlets / flushed tap closest to service line
- First draw
- Time series 30sec, 1, 5, 10 MIN
- Must make other location inaccessible

2) Follow-up Flush sampling (if initial > 15 or 20 ppb) (5, 15 or 20)
- Sample before facility opens/before first use
- 8-18 or 8-12 stagnation
- Collect from outlet after 30 sec. flush

Reference Exhibits 4-3 - 4-8 for specific sampling instructions for specific types of outlets - Below

- Service Lines
- Dry Faucets - 4 types
- Ice makers
- Water faucets

→ * Interior plumbing → conduct follow-up monitoring at previously collected outlets > 15-20 ppb

Plumbing profile Exhibit 3-1 pg 18-23 EPA doc

Department of Utilities

FLINT WATER PLANT

Memorandum

To: Water Plant Personnel

From: Mike Glasgow
Utilities Administrator

Date: October, 22 2015

Subject: **Laboratory testing requirements for current water supply**

Due to the recent change in water supply, the drinking water testing for the water plant laboratory personnel has been adjusted. The testing has been arranged to reflect what was conducted in years prior to operation of the treatment plant from the river. There are a few additional items that have been included, and this schedule may be adjusted as necessary.

AM & PM PLANT RUN:

- Collect & analyze samples for chlorine residual and Coliform Bacteria in the morning and afternoon (at least 4 hours apart) from the following sites on plant grounds:
  Control Station # 2, Dort Well, Pump Station # 4, & Lab Tap

LAB TAP TESTING:

- Collect & analyze lab tap samples once daily for pH, fluoride, total hardness, alkalinity, non-carbonate hardness, calcium, magnesium, total phosphate, temperature and chloride.
- Collect & analyze 3 samples daily (at least 3 hours apart) for Turbidity.
- Collect & analyze 1 sample weekly for Heterotrophic bacteria.

DISTRIBUTION SAMPLING:

- Collect & analyze samples from the 10 distribution sites at least twice weekly for chlorine residual and coliform bacteria. A total of at 100 samples must be collected and analyzed each month, so in total, at least 10 sampling events should take place each month.
- Once weekly also test each distribution site for fluoride, total phosphate, and Heterotrophic bacteria.
- Once quarterly perform Water Quality Parameters (WQM) from the 25 distribution sites. Total phosphate will be a new addition to all the other parameters tested.
- Once quarterly collect Disinfection Byproduct samples (DBP) from 8 sites according to the current DBP schedule. Next sampling will take place the 3rd full week of November.
- Lead & copper sampling will be on going throughout the rest of the year, a detailed plan will be completed soon.

RIVER SAMPLING:

- When time permits, a river sample should be collected once weekly and analyzed for coliform bacteria, pH, fluoride, total hardness, alkalinity, non-carbonate hardness, calcium, magnesium, temperature, turbidity, and chloride.

Flint Water Plant & Facilities 4500 N. Dort Hwy Flint, MI 48505 Phone: (810) 787-6537 Fax (810) 787-3710

Benzie, Richard (DEQ)

From: Shekter Smith, Liane (DEQ)
Sent: Tuesday, August 25, 2015 1:56 PM
To: lwalters313@gmail.com
Cc: Busch, Stephen (DEQ); Devereaux, Tracy Jo (DEQ)
Subject: Follow Up from our Aug. 4th meeting

Dear Ms. Walters,

I wanted to update you regarding our Department's findings related to questions raised during our meeting at the Governor's office on August 4. I apologize for the delay in getting back to you.

Lead and Copper Monitoring

Regarding Flint lead and copper compliance monitoring for the January – June 2015 period, the City has confirmed that all lead and copper samples collected throughout the City, whether routine sites or customer requests, were sent to the State of Michigan lab for analysis. Individual sample results are provided to the property owner within 30 days of receiving the lab results in accordance with the Michigan Safe Drinking Water Act (Public Act 399, 1976 Administrative Rule 410(5). Results from the State of Michigan lab are provided directly to our Office.

Staff have confirmed that the lead 90th percentile compliance calculation of 11 parts per billion is based on 69 samples that met the appropriate sampling location site criteria, and met the sample collection site and collection protocol requirements of the Safe Drinking Water Act for this monitoring period. A minimum of 60 samples were required for this monitoring period. As indicated during the meeting, the City's sampling for lead complies with the Action Level standard of 15 parts per billion, but based on the population served by the City and these results, the City will need to make a recommendation to the MDEQ on how they will fully optimize their corrosion control treatment. These next steps continue to follow the requirements of the Lead and Copper Rule.

Samples collected at your residence of 212 Browning Avenue were not included this compliance determination as you utilize a whole home filter. As stated in the Michigan Safe Drinking Water Act (Public Act 399, 1976 Administrative Rule 710a, Lead and Copper in tap water; monitoring requirements) "Sampling sites may not include faucets that have point of use or point of entry treatment devices designed to remove inorganic contaminants." Such treatment alters the water chemistry and water quality such that it is no longer representative of public water from the City's distribution system. Therefore, the City cannot use samples collected at your residence as part of its determination for public water system compliance with the lead or copper action level standard.

Sample Summary (samples taken at your residence)

For your information, we are providing the information that we've gathered regarding samples collected at your home. Our records indicate between February and June of this year there were six samples collected by either you or Mr. Mike Glasgow with the City of Flint, and submitted to the State Laboratory for analysis as follows:

February 11, Bathroom tap, collected at 10:20 AM by Mike Glasgow. This sample was analyzed for aesthetic metals (copper, iron, manganese, and zinc) which does not include lead analysis.

February 18, Kitchen tap, collected at 7:15 AM by you. This sample was analyzed for lead (104 parts per billion) and copper (non-detect).

February 25, Kitchen tap, collected at 10:26 AM by Mike Glasgow. This sample was analyzed for metals including lead. All results (including lead) were non-detect except for Barium 0.01 parts per million. The result for Barium was well below its maximum contaminant level of 2 parts per million.

March 3, Kitchen tap, collected at 6:00 AM by you. This sample was analyzed for lead (397 parts per billion) and copper (non-detect).

March 18, Kitchen tap, collected at 11:10 AM by Mike Glasgow. This sample was analyzed for lead (4 parts per billion) and copper (non-detect).

April 2, Pre-point of service, collected at 8:00 AM by you. This sample was analyzed for lead (707 parts per billion) and copper (110 parts per billion).

Lead Education/Outreach

As we discussed during the meeting, we support efforts to educate homeowners about the sources of lead in their private residence, provide guidance measures to reduce the potential for lead exposure, and provide information on resources for lead abatement. Along those lines, our Office has been in contact with the Department of Health and Human Services, Environmental Health Division, Healthy Homes Section and had some preliminary discussions about a public education and assistance campaign regarding household lead issues, guidance and abatement.

Lead monitoring by public water systems serves a dual purpose. The first purpose is to ensure the public water supply is adequately treating its water to address corrosion potential and help limit lead exposure. The second purpose is to inform homeowners about lead levels within their individual residence so that they can make educated choices regarding their own exposure risk.

pH Results

During the meeting concerns were also expressed regarding pH levels within customer plumbing systems. As you may know, pH has no associated contaminant level as it is simply a numeric scale used to specify the acidity or alkalinity of a solution. The City of Flint conducts daily monitoring of pH values on both its raw and finished (treated) water at the City's water treatment plant as part of its operations. The City is also required to conduct water quality parameter monitoring in the distribution system, which includes pH. Samples are analyzed in accordance with Standard Methods using properly calibrated analytical equipment. Results for pH from these samples are summarized below.

Since late April 2014 – June 2015, the following pH conditions were reported:

Water Treatment Plant – Finished Water plant tap pH range = 7.07 minimum to 9.9 maximum, overall average 7.7, measured daily. We believe the 9.9 is a one- time anomaly from softening treatment.

Distribution System – Water Quality Parameters taken from 25 sample sites located throughout and monitored quarterly
July – Sept. 2014: pH 7.71 average, range 7.56 – 7.86
Oct. – Dec. 2014: pH 7.88 average, range 7.62 – 8.10
Jan. – March 2015: pH 7.81 average, range 7.60 – 7.99
April – June 2015: pH 7.63 Average, range 7.48 – 7.80

In addition, the City's treated water contains alkalinity, which is a measurement of the buffering capacity of water to resist a change in pH. As you can see from the water quality parameter monitoring results above there has been very little change in pH within the City's distribution system. The pH levels described within customer site piping or premise plumbing systems are believed to be the result of onsite treatment and not representative of water quality shown to be occurring in the public water supply system.

Consumer Confidence Report

Finally, there was confusion during the meeting regarding the City's annual water quality report, the Consumer Confidence Report which we have since been able to clarify.

The City of Flint issued two separate Consumer Confidence Reports (CCR's) in 2015 covering the water quality data from 2014. One report was for the period of January – April 2014 when the City was obtaining water from Detroit (DWSD). And a second report was for the period April – December 2014 when the City was using the Flint River and its own Water Treatment Plant.

The CCR for DWSD water was mailed to customers in June. The Flint River based CCR was mailed to customers in mid-July, delayed due to issues with the printing contractor. We agree that having two separate reports caused confusion. We are working with the City to ensure both reports are posted to the City's website and both are made available when requested by customers. Should the City choose to create separate CCR's during the year that the City of Flint connects to the Karegnondi Water Authority we will work with the City to provide more clarity and try to have all material included in a single mailing.

The DWSD based CCR is the one community members had at the meeting, while the DEQ brought a copy of the Flint River based CCR. As separate and distinct sampling was done under each source, this explains the discrepancy in the values and monitoring periods being reported in the respective CCR's.

We appreciate your interest in these matters and hope this has addressed many of the questions brought up during our meeting. I would like to provide this information to both Dr. Sullivan and Ms. Mayes, but I do not have their contact information. I'm hoping you can share this with them and any others that may be interested.

Sincerely,

Liane J. Shekter Smith, P.E., Chief
Office of Drinking Water and Municipal Assistance
Michigan Department of Environmental Quality
517-284-6543

Community Water Supplies Addressing a Current/Recent Lead Action Level Exceedance

County	WSSN	NAME	Population	Owner	Status
OSCODA	00324	AUSABLE VALLEY COMMUNITY	147	private	Existing corrosion control strategy insufficient and being re-evaluated.
LENAWEE	817	BOYSVILLE	44	private	Conducting increased monitoring. 1st round of sampling complete and below action level. Waiting on 2nd round results.
GENESEE	01353	CHATEAUX DU LAC CONDOMINIUMS	100	private	Corrosion control treatment permit issued November 2015.
OAKLAND	03666	KNORRWOOD KNOLLS SUBDIVISION	240	local	Conducting increased monitoring.
GENESEE	6575	SUGARTREE	320	private	Conducting increased monitoring. 1st round of sampling complete and below action level.
CHEBOYGAN	6705	UAW FAMILY EDUCATION CENTER	450	private	Conducting increased monitoring. 1st round of sampling complete and below action level. Waiting on 2nd round results.
CALHOUN	40090	Twin Pines MHP	182	private	Exceedence determined December 2015. Increased monitoring to begin Jan-Jun 2016.
LIVINGSTON	40319	ALAN'S PARK MHP - FOWLERVILLE	498	private	Conducting increased monitoring. 1st round of sampling complete and below action level. Waiting on 2nd round results.

1/7/2016

CWS exceeding lead or copper action level in most recent round of monitoring (based on data available as of 11/17/2015)

District	WSSN	NAME	Population	Owner	Mon Prd	Prd Begin	Prd End	Analyte	90th (mg/L)	Notes
Genesee	01353	CHATEAUX DU LAC CONDOMINIUMS	100	private	6M 2014-2	01-Jul-14	31-Dec-14	Lead	0.079	OCCT permit issued Nov 2015
Livingston	40319	ALAN'S PARK MHP - FOWLERVILLE	498	private	3YR 13-15	01-Jan-13	31-Dec-15	Lead	0.04	currently over
Oscoda	00324	AUSABLE VALLEY COMMUNITY	147	private	1YR 2015	01-Jan-15	31-Dec-15	Lead	0.0676	existing OCC strategy insufficient, re-evaluating
Oakland	03666	KNORRWOOD KNOLLS SUBDIVISION	240	local	3YR 13-15	01-Jan-13	31-Dec-15	Lead	0.02	currently over
Macomb	40327	SPRINGBROOK ESTATES MHP	1008	private	6M 2015-1	01-Jan-15	30-Jun-15	Copper	1.4	OCCT installed Sep 2014
Marquette	01820	ELY TOWNSHIP-DIORITE	168	local	6M 2015-1	01-Jan-15	30-Jun-15	Copper	1.42	existing OCCT insufficient, re-evaluating
Keweenaw	2590	SHERMAN TOWNSHIP	40	local	3YR 13-15	01-Jan-13	31-Dec-15	Copper	1.6	will be installing OCCT

Flint Drinking Water Task Force (FTF 15-2)

Task Force Comments on Flint's Residential Drinking Water Lead & Copper Sampling Instructions

EPA received the draft of Flint's Residential "Drinking Water Lead & Copper Sampling Instructions" for comment from Jim Sygo, MDEQ, on November 13, 2015. Below are comments from EPA's Flint Safe Drinking Water Task Force.

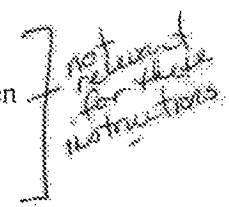
General

It should be clearly stated that these sampling instructions are for LCR compliance monitoring – from now on without the pre-flushing.

Specific Comments

1. The Task Force agrees with the removal of pre-flushing.

2. In the "Dear Resident" cover paragraph, we suggest changing the text "...provide a more accurate gauge of the amount of lead exposure...", because though this is a much better representation of the water intended to be captured by the LCR, it DOES NOT REPRESENT EXPOSURE. We suggest: "The new method is designed to provide a more accurate gauge of lead levels at the tap under normal household use using the current regulatory sampling requirements." We recommend that when the residents are sent their results, that it includes an explanation that the result does not represent lead exposure and that first draw samples have been found to underestimate lead levels in direct contact with a lead service line. It is recommended that customers continue to use the water filters that have been provided to minimize lead exposure.



3. Item 1 needs to require that samples be unfiltered/untreated. Samples may be taken from either a kitchen or bathroom faucet commonly used for drinking, provided the faucet used has no filter attached or the filter has been bypassed. Instructions need to be provided on how to bypass the faucet mount filters that have been distributed. Other home treatment devices must be bypassed too. If the resident has questions about how to bypass a treatment device, they should call the water supply.

Depending on which Flint and MDEQ feel would be more easily understood by residents, the following are two potential alternatives to current Item 1 that would ensure only untreated/unfiltered samples are collected:

Alternative 1

Select an unfiltered/untreated faucet in the KITCHEN or BATHROOM that is commonly used for drinking. DO NOT use a faucet that has a filter attached to it unless you bypass the filter. DO NOT use a faucet that is connected to a home water treatment device (like a water softener, iron filter, reverse osmosis) unless you bypass the home water treatment device. DO NOT sample from a laundry sink or a hose spigot as these samples cannot be used by your utility.

Flint Drinking Water Task Force (FTF 15-2)

Alternative 2

1: Does the kitchen tap have a faucet mount filter or a reverse osmosis unit on it? If NO, go to 1a. If YES, go to 1b.

a) Select a faucet in the KITCHEN or BATHROOM that is commonly used for drinking. DO NOT use a faucet that is connected to a home water treatment device (like a water softener, iron filter, reverse osmosis) unless you bypass the home water treatment device. DO NOT sample from a laundry sink or hose spigot as these samples cannot be used by your utility.

b) Select a BATHROOM faucet that is commonly used and does not have a treatment device attached to it. DO NOT use a faucet that is connected to a home water treatment device (like a water softener, iron filter, reverse osmosis) unless you bypass the home water treatment device. DO NOT sample from a laundry sink or hose spigot as these samples cannot be used by your utility.

There should be a question on the form asking if the resident has installed a faucet mount filter, so this can be recorded (see suggested change to 4C in comment 6 below). [Note: Installing the faucet mount filter would require the removal of the faucet's aerator. Does MDEQ know if the faucet mount filters being used have an aerator screen in the unit?]

4. On Item 2, the LCR currently has no upper limit on standing time, and we have published research data showing that under normal usage conditions, lead release may not have even reached equilibrium at 12 hours. The minimum of 6 hours stagnation time is used rather than a longer time so as not to discourage people from volunteering to take lead and copper samples. Therefore, for consistency with the text of the rule, we recommend just leaving it at "Wait at least 6 hours..." We understand it's not useful to collect from totally inappropriate conditions, such as vacant houses and immediately after extended vacations, but the introductory paragraph clarifies that it represents the water they would "typically drink." If it is necessary to have a maximum stagnation time, then we recommend that you use a maximum of 24 hours which is consistent with the approach that was discussed with the National Drinking Water Advisory Council Working Group as an option in 2014.

5. Again in Item 2, there must be an instruction to not use the water anywhere in the house during the stagnation period. Depending on the house plumbing configuration and pipe inside diameter (ID), using other taps, toilets, bathtubs, dishwashers, etc. may draw water from the zone of plumbing captured in a 1 liter sample. That will usually cause a low bias to the results, by bringing in fresh water. Only rarely is LSL water brought precisely into that volume captured by the sample. So, instructions need to be clear about no water use in the house.

6. Recommended language for Item 4C (for inventory purposes and to verify that the sample was unfiltered/untreated):

- Does this faucet have a faucet mount filter such as the lead filters provided to the community? Yes/No

    - If Yes, was the faucet mount filter bypassed during the sampling? Yes/No
- Is this faucet connected to a reverse osmosis unit? Yes/No
    - If Yes, was the reverse osmosis unit bypassed during the sampling? Yes/No
- Does the house have a home treatment device, such as a water softener or iron removal device or any other type of water treatment? Yes/No
    - If Yes, please describe _____
    - Was this home treatment device in use during sampling or the day before sampling? Yes/No

7. In our experience, and in the experience of other utilities who try to use the LCR monitoring data to assess effectiveness of their treatment for the control of lead release, the form should ask for the resident to note the approximate time of last use of that faucet from which the sample is taken, as well as the time the bottle is filled. Since the typical 6-12 hour period is not really at equilibrium in most cases, soluble lead could differ by a substantial amount from a 6 hour standing sample to, say, a 10 or 12 hour standing sample. When interpreting the data, that is good to know.

8. Not covered by the questions, but a recommendation we need to make, is to suggest that there is good research evidence that higher flow rates are the typical conditions for when consumers turn their faucets on. More particulate lead can be eroded in some circumstances, so using a wide-mouth bottle allows a much more representative sample to be collected for the conditions of consumer use. Our understanding is that MDEQ furnishes the bottles, so we recommend to change the type of bottle provided. The furnished bottles with the smaller mouth can only be filled without splashing at flow rates that are much lower than what someone normally uses to fill glasses, coffee pots, pots for cooking, etc.

These changes should be made to all of the sampling recommendations or instructions from MDEQ to all systems, not just Flint.

Michigan Department of Community Health

Flint Water Lead Communication Plan

September 9, 2015

Presented by:

MDHHS-DEH Toxicology & Response Section

Plan Overview

Project: Flint Water Lead

Name of Campaign: To be Determined (e.g. Lead us to Water: Flint Clean Water)

Objective

The Michigan Department of Health & Human Services has a mission to protect, preserve, and promote the health and safety of the people of Michigan with particular attention to providing for the needs of vulnerable and under-served populations. The residents of Flint currently perceive problems related to the usage of the Flint River as their temporary water source until a pipeline is completed which will bring water from Lake Huron. Problems – both substantiated and unsubstantiated included excess TTHM, discolored water, and high levels of lead in tap water. These problems have given rise to a well-organized community group Water You Fighting For (wateryoufightingfor.com) and has gotten the attention of water activists/researchers from Virginia Tech University (flintwaterstudy.org).

Given there is no safe level of lead for young children, a public health outreach campaign to inform the public of the sources of lead in their community is recommended. MDHHS will promote collaboration between the City of Flint, the County Health Department, community members, and other interested parties to halt human exposure of lead through development and proactive delivery of scientifically accurate information delivered in multiple formats at a literacy level that is accessible to all.

Background

Drinking water analytical reports find that the water meets the federal drinking water standards and is safe for public consumption. The aesthetic quality of the water, which may make the water unappealing to drink or use, does not make the water unsafe. Poor aesthetic quality, if true, will be a barrier to conducting an effective public health outreach campaign.

Lead is not found to be elevated in the drinking water at the source; however, citizens have reported high lead levels in their tap water. Sources of lead to the tap water are likely from lead piping or solder in or entering the home. Lead piping and solder are sources that the home-owner needs to know how to address. Additionally, older homes (pre-1978) can have lead containing paint and homes near historic high-traffic areas can have elevated lead levels in soil.

Target Markets

- Citizens of Flint who use Flint City Water
- Citizens of Flint who live in homes built in 1987 or before
- Citizens of Flint who are pregnant or have children living in the home that are 6 or under

Message Summary

- There are personal actions individuals can take to prevent exposure to lead.
- Lead exposure does not just occur through water.
- You can be tested for blood lead levels to determine if you or your children been exposed.
- There are resources available to assist with remediation.

Call to Action

Exposure to lead through pipes, paint, and soil are preventable. There are steps people can take to be proactive in preventing their exposure and potential health issues. MDHHS notes that this problem is also not limited to Flint. This campaign will be created and piloted with the City of Flint, but may be expanded statewide.

Project Plan

Public Meetings –

- Begin with small groups to identify key stakeholders
- Plan larger meeting addressing
    - the lifespan of water from source to treatment center to home
    - how people can identify if their home may be affected
    - what the VTU results really mean
    - what can be done on an individual, city, and state level

e-Toolkits, Social Media & Print Outreach

- Compile existing information on being lead-safe
- Create easily shared infographics – what can be done, what are signs and symptoms
- Create brochures about health effects of lead

Project Timeline

Responsibilities	Target Date	Objective	Tasked to:
TBD	TBD	TBD	TBD

Current Media Review

http://www.washingtontimes.com/news/2015/sep/2/flint-water-is-risky-in-old-homes-researchers-say/

http://www.mlive.com/news/flint/index.ssf/2015/07/marchers_continue_drumbeat_for.html

- great photos

http://www.washingtontimes.com/news/2015/jul/10/activists-rally-about-water-in-flint-after-weeklon/

http://www.deadlinedetroit.com/articles/12697/scary_leaded_water_and_one_flint_family_s_toxic_nightmare#.VfCCoBFVhBc

http://flintwaterstudy.org/about-page/about-us/

http://www.wateryoufightingfor.com/

http://www.mlive.com/news/flint/index.ssf/2015/09/flint_mayoral_challenger_calls.html

http://www.mlive.com/news/flint/index.ssf/2015/09/mayor.html

http://michiganradio.org/post/team-testing-flint-water-lead-sample-sample#stream/0

http://www.mlive.com/news/flint/index.ssf/2015/09/new_testing_shows_flint_water.html

- On Monday, Aug. 31, the researchers reported 42 percent of 120 initial samples from Flint had lead levels that were more than 5 parts per billion, "which suggests a serious lead-in-water problem, according to our experience and criteria."
- The EPA requires water systems like Flint's to collect tap samples from sites that are more likely to have plumbing materials containing lead.
- If more than 10 percent of samples exceed 15 ppb, then water systems are required to take action, including steps to optimize corrosion control treatment.
- "The city of Flint has offered free and independent testing to residents since spring, and I encourage people to use this service if they have questions," Walling's statement said.
- Edwards, a professor of civil and environmental engineering, said the elevated lead levels he has seen in Flint tap water are tied to a corrosive water source that contains about eight times more chloride than Detroit water does.
- "Chloride is generally considered to be very corrosive to iron. For instance, chloride present in road salts applied in the winter causes iron in cars and bridges to rust," the Virginia Tech team's website says.
- "This could be a huge public health problem. ... The Flint water just ate the pipe up," Edwards said of the testing he has overseen so far.
- "If it were me, I would not be using (Flint River water) for cooking or drinking unless I had it tested for lead," said Edwards, who previously mounted a six-year campaign that succeeded in forcing the U.S. Centers for Disease Control and Prevention to admit it had misled the public about the risk of lead in the Washington, D.C., area's drinking water, according to The

Washington Post.

- Since the switch, the city has been plagued by issues such as water main breaks and boil water advisories because of bacteria and has been in violation of the Safe Drinking Water Act because of high levels of total trihalomethanes (TTHM), a byproduct of chlorinating river water.
- The Rev. Allen Overton, who hand-delivered petitions to Walling on Monday, asking that city officials reconnect the Flint water system to Detroit, said Wednesday that the Virginia Tech experiment is more evidence Flint is not using the best quality of water available.
- "We have a major health issue here, (and) they are not being honest with the citizens of Flint," Overton said.

Flint Water Petition:

https://secure3.convio.net/fww/site/Advocacy;jsessionid=7266B35978FAD2EFBD3A57D87D5085AB.app334b?pagename=homepage&page=UserAction&id=2199&autologin=true&s_src=blg&s_subsrc=070915a

Dear [Flint Mayor Dayne Walling and Flint City Council],

Water is a basic human right. The United Nations General Assembly recognizes that access to safe drinking water and sanitation are essential to the realization of all human rights.

In 2014, Flint's emergency manager disconnected the city from the Detroit Water and Sewerage Department (DWSD) and started providing residents with water from the Flint River. Since that time, residents have been struggling to maintain access to a clean, safe drinking water supply.

Residents of Flint report having tap water with high levels of copper, lead, THMs (chemicals that result when chlorine mixes with organic matter), tin, lime and iron. The water is often brown or bluish-green in color and contains sediment. As a result, people are experiencing symptoms including hair loss, lead poisoning and diseases related to consuming high levels of copper (to name a few).

The Flint River clearly is not a safe, reliable source for the city's drinking water. It was as easy as pushing a button to disconnect from DWSD; it's time to push the button again, reconnecting Flint to DWSD and providing Flint residents with the clean, safe water they deserve.

Please reconnect Flint to the Detroit Water and Sewerage Department immediately and make water safe and clean for all.

Sincerely,
[Your Name]
[Your Address]
[City, State ZIP]

Washington DC

https://www.dcwater.com/lead/

- Sources of lead in drinking water

- **Lead service pipe**
  In the U.S., lead service pipes were installed until the mid-1950s. Older properties may still have lead service pipes, which connect the water main in the street to household plumbing. The service pipe is owned by the property owner. Under certain conditions, DC Water is authorized to repair, maintain or renew the portion of the service pipe in public space. The maintenance of the portion of the service pipe on private property is the exclusive responsibility of the property owner. A "partial" lead service pipe replacement is where a portion of the service pipe is replaced, but a portion made of lead remains in public or private space.

  Lead service pipes were installed until the mid-1950s.

- **Lead solder**
  This connects pipes in household plumbing. In 1987, lead solder was banned from use in household plumbing. If your house was built before 1987, your plumbing may have lead solder.

- **Brass faucets, valves or fittings**
  Almost all faucets, valves and fittings have brass components. Until 2014, brass faucets and fittings sold in the U.S. and labeled "lead-free" could contain up to eight percent lead. Effective January 2014, the Reduction of Lead in Drinking Water Act specifies that these materials may not contain more than 0.25 percent lead.

- **Galvanized iron pipes**
  Household galvanized pipes are old, corroded pipes that were installed in many homes before the 1960s. These pipes can release lead in water if the property has, or previously had, a lead service pipe. Galvanized pipes are made with a protective layer of zinc. However, the zinc layer erodes over time and results in corrosion. When lead is released from a lead service pipe and passes through galvanized plumbing (particularly over decades of use), lead can accumulate on the inside, corroded walls of this plumbing.

  Lead release from galvanized pipes can vary from home to home and can continue to occur even after a lead service pipe is replaced. Galvanized pipes can cause other water quality problems, such as low water pressure and discolored water. For additional information on household plumbing, click here.

https://www.sciencenews.org/article/stillbirth-rates-tied-lead-drinking-water

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
Pre-1967	Flint Water Treatment Plant in operation using Flint River for drinking water	1
Post-1967	Flint switched to Detroit Water and Sewerage Department for drinking water	None
January 2006	Discussions regarding Karegnondi Water Authority, *Preliminary Long-Term Water Supply for Genesee County*	2
June 25, 2009 September 2009	*Lake Huron Water Supply Study* *Karegnondi Water Authority* Executive Summary and Preliminary Engineering Report	3
March 2013	*Analysis of the Flint River as a Permanent Water Supply for the City of Flint*; Prepared for: City of Flint dated July 2011	4
April 2013	Flint notifies Detroit Water and Sewerage Department of contract discontinuation and joins the Karegnondi Water Authority	5
April 2013	Detroit Water and Sewerage Department sets termination of Flint water service contract to April 17, 2014	6
June 2013	Flint notifies the Department of Environmental Quality of intent to operate Flint Water Treatment Plant full time using Flint River for drinking water	7
April 2014	The Michigan Department of Environmental Quality issues Flint Water Treatment Plant construction permits for full time operation enhancements W141025 and W141026	9
May 2014	Flint stops purchasing Detroit Water and Sewerage Department water. Starts using the City of Flint Water Treatment Plant and Flint River for drinking water	10
August 2014	Flint *E. coli* bacteria violation, Localized System Boil Water Advisory	11
September 2014	Disinfection Byproducts compliance communication; the Michigan Department of Environmental Quality requests preemptive Operational Evaluation	12
September 2014	Flint Total Coliform Bacteria violation, Localized System Boil Water Advisory	13

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
October 2014	General Motors announces decision to stop using Flint River as source for production water	14
December 2014	Disinfection Byproducts quarterly violation begins	15
December 31, 2015	1st 6-month round of lead and copper monitoring ends. Results due from Flint to Michigan Department of Environmental Quality on January 10, 2015	None
January 21, 2015	City of Flint Public Meeting regarding disinfection byproducts and bacteria	17
February 26, 2015	E-mail from United States Environmental Protection Agency to Michigan Department of Environmental Quality regarding elevated lead sample	18
February 27, 2015	E-mail from United States Environmental Protection Agency to Michigan Department of Environmental Quality inquiring about Optimized Corrosion Control Treatment	19
February 27, 2015	Michigan Department of Environmental Quality response to United States Environmental Protection Agency email with statement regarding optimized corrosion control program	20
March 5, 2015	2nd Disinfection Byproducts quarterly violation notice	21
March 30, 2015	Michigan Department of Environmental Quality notifies Flint of Lead/Copper Monitoring Results.	16
April 3, 2015	Long Term 2 Enhanced Surface Water Treatment Rule Letter	22
April 6, 2015	Flint proposes installation of Granular Activated Carbon Filter media to reduce disinfection byproducts	23
April 23, 2015	United States Environmental Protection Agency e-mail to Michigan Department of Environmental Quality regarding corrosion control treatment	24
April 24, 2015 May 1, 2015	Michigan Department of Environmental Quality responds to United States Environmental Protection Agency regarding corrosion control treatment	25

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
April 27, 2015	United States Environmental Protection Agency provided bottles to 212 Browning for lead/copper analyses	26
May 6, 2015	Lead service line replaced at 212 Browning. United States Environmental Protection Agency on-site	27
May 28, 2015	Internal United States Environmental Protection Agency e-mail regarding results at 212 Browning	29
June 9, 2015	3rd Disinfection Byproducts quarterly violation notice	30
June 10, 2015	Semi-Annual Conference call with United States Environmental Protection Agency	31
June 30, 2015	E-mail from United States Environmental Protection Agency scheduling conference call on July 21, 2015 regarding elevated lead result and concerns regarding corrosion control	32
June 30, 2015	2nd 6-month round of lead and copper monitoring ends. Results due from Flint to Michigan Department of Environmental Quality on July 10, 2015	None
July 9, 2015	Michigan Department of Environmental Quality informed that United States Environmental Protection Agency draft internal memo is on ACLU website	33
July 14, 2015	Michigan Department of Environmental Quality issues construction permit to Flint for Granular Activated Carbon filter media W151055	34
July 21, 2015	Conference call with United States Environmental Protection Agency (Lead and Copper Rule implementation and Flint) during which it informs Michigan Department of Environmental Quality its interpretation of Lead and Copper Rule	35
July 24, 2015	Michigan Department of Environmental Quality e-mail and draft letter 90th percentile lead determination = 11 parts per billion and City of Flint requirement to add corrosion control treatment	36

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
July 28, 2015	Michigan Department of Environmental Quality received blood lead level information from Michigan Department of Health and Human Services indicating that results since the switch to the Flint River are consistent with past years seasonal variations	37
August 4, 2015	Meeting with city representatives at Governor's office	38
August 17, 2015	Michigan Department of Environmental Quality notifies Flint of lead/copper monitoring results and requires City to install corrosion control treatment	39
August 23, 2015	Michigan Department of Environmental Quality notified by an external party that a water quality study was about to begin in Flint	40
September 2, 2015	Disinfection Byproducts return to compliance	43
September 11, 2015	United States Environmental Protection Agency e-mail confirming that Michigan Department of Environmental Quality was never sent the draft June 24, 2015 memo	44
September 21, 2015	Meeting with Congressional representatives, legislators, United States Environmental Protection Agency and Michigan Department of Environmental Quality to discuss issues with water quality in Flint	45
September 22, 2015	Meeting/Conference call with Michigan Department of Health and Human Services, Genesee County Health Department, and Michigan Department of Environmental Quality to discuss lead education/outreach	46
September 24, 2015	Hurley Children's Hospital data reveals elevated blood lead levels in Flint children	47
September 24, 2015	Michigan Department of Health and Human Services response affirms State blood lead level data is more comprehensive than Hurley Hospital data	None

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
September 25, 2015	Flint issues Lead Advisory regarding drinking water	48
October 1, 2015	State Chief Medical Officer confirms Hurley blood lead level data	None
October 1, 2015	Genesee County Health Department issues "Do Not Drink" Advisory	49
October 2, 2015	Michigan Department of Environmental Quality and Michigan Department of Health and Human Services press conference. Governor's Flint Action Plan announced.	50
October 2, 2015	Genesee County Health Department school screening water samples collected for lead analysis	51
October 8, 2015	Governor Press Conference: Flint to reconnect to Great Lakes Water Authority/Detroit Water and Sewerage Department	52
October 15, 2015	State Legislature authorizes a $9 million to assist the City of Flint to pay for the return to the Detroit water system and to fund staff at schools to gauge lead exposure	None
October 16, 2015	First weekly coordination meeting held between the City of Flint and state agencies	None
October 16, 2015	Michigan Department of Environmental Quality meets with Flint Schools Superintendent and Genesee County Health Department	None
October 16, 2015	Flint switches back to Detroit Water and Sewerage Department for water	53
October 21, 2015	Governor Snyder announces formation of Flint Water Task Force to complete an After-Action Review	None
October 28, 2015	Michigan Department of Environmental Quality issues construction permit for additional corrosion control treatment W151104	54
October 30, 2015	Michigan Department of Environmental Quality letter to Flint regarding corrosion control treatment operation	55

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
FLINT DRINKING WATER EVENTS TIMELINE

Date	Event	Attachment
November 3, 2015	United States Environmental Protection Agency Memorandum regarding "Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems"	56
November 4, 2015	United States Environmental Protection Agency Memorandum regarding "Transmittal of Final Report – High Lead at Three Residences in Flint, Michigan"	57
Mid-Late 2016	Planned connection to Karegnondi Water Authority (Lake Huron water to Flint Water Treatment Plant)	None

FLINT DRINKING WATER EVENTS TIMELINE
ATTORNEY CLIENT PRIVILEGE – DRAFT 11/6/2015

Date	Event	Attachment
Pre-1967	Flint Water Treatment Plant in operation using Flint River for drinking water	1
Post-1967	Flint switched to DWSD for drinking water	None
Jan 2006	Discussions regarding Karegnondi Water Authority, *Preliminary Long-Term Water Supply for Genesee County*	2
June/Sept 2009	*Lake Huron Water Supply Study Karegnondi Water Authority* Executive Summary and Preliminary Engineering Report	3
March 2013	*Analysis of the Flint River as a Permanent Water Supply for the City of Flint*; Prepared for: City of Flint dated July 2011	4
April 2013	Flint notifies DWSD of contract discontinuation and joins the Karegnondi Water Authority	5
April 2013	DWSD sets termination of Flint water service contract to April 17, 2014	6
June 2013	Flint notifies DEQ of intent to operate Flint Water Treatment Plant full time using Flint River for drinking water	7
April 2014	DEQ issues Flint WTP construction permits for full time operation enhancements W141025 and W141026	9
May 2014	Flint stops purchasing DWSD water. Starts using the City of Flint WTP and Flint River for drinking water	10
Aug 2014	Flint E.Coli Bacteria violation, Localized System Boil Water Advisory	11
Sept 2014	Disinfection Byproducts (TTHM), DEQ requests preemptive Operational Evaluation	12
Sept 2014	Flint Total Coliform Bacteria violation, Localized System Boil Water Advisory	13
Oct 2014	General Motors announces decision to stop using Flint River as source for production water	14

FLINT DRINKING WATER EVENTS TIMELINE
ATTORNEY CLIENT PRIVILEGE – DRAFT 11/6/2015

Date	Event	Attachment
Dec 2014	Disinfection Byproducts quarterly violation begins	15
Dec 31, 2015	1st 6-month round of lead and copper monitoring ends, 100 samples 90th percentile lead level, 6 parts per billion. Results due from Flint to DEQ on January 10, 2015	16
Jan 21, 2015	City of Flint Public Meeting regarding disinfection byproducts and bacteria	17
Feb 26, 2015	E-mail from EPA to DEQ regarding elevated lead sample	18
Feb 27, 2015	E-mail from EPA to DEQ inquiring about Optimized Corrosion Control Treatment	19
Feb 27, 2015	DEQ response to EPA email with statement regarding optimized corrosion control program	20
March 5, 2015	2nd Disinfection Byproducts quarterly violation notice	21
April 3, 2015	LT2 Surface Water Treatment Rule Letter	22
April 6, 2015	Flint proposes installation of Granular Activated Carbon Filter media to reduce disinfection byproducts	23
April 23, 2015	EPA e-mail to DEQ regarding corrosion control treatment	24
April 24 and May 1, 2015	DEQ responds to EPA regarding corrosion control treatment	25
April 27, 2015	EPA provided bottles to 212 Browning for lead/copper analyses	26
May 6, 2015	Lead service line replaced at 212 Browning. EPA on-site	27
May 28, 2015	Internal EPA e-mail regarding results at 212 Browning	29
June 9, 2015	3rd Disinfection Byproducts quarterly violation notice	30
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Date	Event	Attachment
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July 9, 2015	DEQ informed that EPA draft internal memo is on ACLU website	33
July 14, 2015	DEQ issues construction permit to Flint for Granular Activated Carbon filter media W151055	34
July 21, 2015	Conference call with EPA (LCR implementation and Flint) during which it informs DEQ its interpretation of LCR	35
July 24, 2015	DEQ e-mail and draft letter 90th percentile lead determination = 11 parts per billion and City of Flint requirement to add corrosion control treatment	36
July 28, 2015	DEQ received blood lead level information from DHHS indicating that results since the switch to the Flint River are consistent with past years seasonal variations	37
Aug 4, 2015	Meeting with city representatives at Governor's office	38
Aug 17, 2015	DEQ notifies Flint of lead/copper monitoring results and requires City to install corrosion control treatment	39
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Sept 21, 2015	Meeting with Congressional representatives, legislators, EPA and DEQ to discuss issues with water quality in Flint	45
Sept 22, 2015	Meeting/Conference call with DHHS, GCHD, and DEQ to discuss lead education/outreach	46
Sept 24, 2015	Hurley Children's Hospital data reveals elevated blood lead levels in Flint children	47

FLINT DRINKING WATER EVENTS TIMELINE
ATTORNEY CLIENT PRIVILEGE – DRAFT 11/6/2015

Date	Event	Attachment
Sept 24, 2015	DHHS response affirms State blood lead level data is more comprehensive than Hurley Hospital data	None
Sept 25, 2015	Flint issues Lead Advisory regarding drinking water	48
Oct 1, 2015	State Chief Medical Officer confirms Hurley blood lead level data	None
Oct 1, 2015	GCHD issues "Do Not Drink" Advisory	49
Oct 2, 2015	DEQ and DHHS press conference. Governor's Flint Action Plan announced.	50
Oct 2, 2015	GCHD school screening water samples collected for lead analysis	51
Oct 8, 2015	Governor Press Conference: Flint to reconnect to Great Lakes Water Authority/Detroit Water and Sewerage Department	52
Oct 15, 2015	State Legislature authorizes a $9 million to assist the City of Flint to pay for the return to the Detroit water system and to fund staff at schools to gauge lead exposure	None
Oct 16, 2015	First weekly coordination meeting held between the City of Flint and state agencies	None
Oct 16, 2015	DEQ meets with Flint Schools Superintendent and Genesee County Health Department	None
Oct 16, 2015	Flint switches back to DWSD for water	53
Oct 21, 2015	Governor Snyder announces formation of Flint Water Task Force to complete an After-Action Review	None
Oct 28, 2015	DEQ issues construction permit for additional corrosion control treatment W151104	54
Oct 30, 2015	DEQ letter to Flint regarding corrosion control treatment operation	55
Mid-Late 2016	Planned connection to Karegnondi Water Authority (Lake Huron water to Flint WTP)	None

Benzie, Richard (DEQ)

From: Busch, Stephen (DEQ)
Sent: Tuesday, March 17, 2015 2:02 PM
To: Howard Croft (hcroft@cityofflint.com); Brent Wright (bwright@cityofflint.com); mglasgow@cityofflint.com; Daugherty Johnson (djohnson@cityofflint.com)
Cc: Gerald Ambrose (gambrose@cityofflint.com); nhenderson@cityofflint.com; Prysby, Mike (DEQ)
Subject: Water Quality Optimization Strategy

Howard,

As Mike Prysby and I mentioned during our phone call earlier today, the City should be taking action to optimize water quality in the City's distribution system which will in turn provide the City's water customers with water quality that helps limit the potential for legionella occurrence in premise plumbing. It is recognized that contraction of Legionnaires' Disease is not from ingestion of potable water and not regulated under Safe Drinking Water Act requirements. Further, there is currently no direct evidence of legionella in the City's public water system. However, actions by the City of Flint water system can help minimize the potential for an outbreak in customer plumbing systems.

These actions include the following:

- Water main pigging and flushing to remove biofilm, tuberculation, and sediment throughout the distribution system. Failure to remove such material will limit the effectiveness of any disinfectant. Pigging is the preferred process and equipment can be obtained at minimal cost. As the growth range for legionella starts at 68 degrees F, conducting this work as soon as possible in the spring and early summer with cooler temperatures would help reduce the potential for formation under warmer water conditions.

- Maintain pH levels of 7.2-7.8 in finished water and distribution system when possible to maximize the disinfection and oxidation potential of the hypochlorous acid residual (versus the less potent hypochlorite ion). Any optimized corrosion control plan practices regarding pH levels must be taken into consideration.

- Maintain a minimum free chlorine residual of 0.5 mg/L throughout the distribution system when possible. Continuous residual at this level has been shown to be effective in control of legionella. (This will need to be balanced with requirements to limit TTHM formation and comply with the TTHM standard.)

- Continuous operation and optimization of the ozone treatment equipment to treat raw source water. Ozone is highly effective in the destruction of legionella bacteria.

- Conduct routine monitoring for legionella bacteria at the water treatment plant tap and at locations in the distribution system. Note: sample locations must take water directly off the main and not be from premise plumbing systems. Distribution locations could include storage tank inlets or pumping stations. Monitoring at the WTP plant tap would demonstrate removal of any legionella present in raw source water. A private laboratory that specializes in water sample analysis for legionella would need to be used.

- Optimize water treatment plant operation for pathogen reduction under surface water treatment rule requirements. Optimizing the removal for similar pathogens can help reduce the potential for legionella.

A conference call with City staff would probably be best to facilitate further discussions of these actions in more detail. Mike and I can make ourselves available this week to discuss and answer any questions.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF WATER

NOV 03 2015

MEMORANDUM

SUBJECT: Lead and Copper Rule Requirements for Optimal Corrosion Control Treatment for Large Drinking Water Systems

FROM: Peter C. Grevatt, Director
Office of Ground Water and Drinking Water

TO: EPA Regional Water Division Directors, Regions I-X

This memorandum addresses certain concerns raised about the application of the 1991 Lead and Copper Rule, specifically the requirements pertaining to maintenance of optimal corrosion control treatment, in situations in which a large water system ceases to purchase treated water and switches to a new drinking water source. These concerns have been raised most recently in regard to the drinking water system in Flint, Michigan, where the water system was disconnected from the Detroit Water and Sewerage Department, which provided corrosion control treatment for Lake Huron source waters, and instead began distributing water from the Flint River. This type of situation rarely arises and the language of the LCR does not specifically discuss such circumstances. After reviewing the rule with our Office of General Counsel, it appears that there are differing possible interpretations of the LCR with respect to how the rule's optimal corrosion control treatment procedures apply to this situation, which may have led to some uncertainty with respect to the Flint water system. This memorandum clarifies how the LCR applies to this situation and eliminates the uncertainty for water systems and primacy agencies that may face these circumstances in the future.

It is important for large systems and primacy agencies[1] to take the steps necessary to ensure that appropriate corrosion control treatment is maintained at all times, thus ensuring that public health is protected. This memorandum focuses on those steps and clarifies, on a prospective basis, how EPA interprets the LCR corrosion control requirements and how primacy agencies should apply these requirements to large public water systems before, during and after making a significant change in source water, including switching from purchased water to a new source.

Under the LCR, all large systems (those serving more than 50,000 persons), whether purchasing water or not, must have completed a series of steps to either optimize the corrosion control treatment or be deemed to have optimal corrosion control treatment (OCCT) by 1998. 40 CFR 141.81. Key steps for

[1] The term "primacy agency" refers to the State, tribe or U.S. Environmental Protection Agency regional office having jurisdiction over, and primary enforcement responsibility for, a given public water system.

optimizing corrosion control include monitoring, corrosion control studies, installation of treatment, follow-up sampling and specification by the primacy agency of water quality parameters (WQPs) for monitoring corrosion control. The LCR requires any large system that has met the OCCT requirements through the installation of corrosion control treatment to continue operating and maintaining the treatment and to continue meeting the WQPs established by the primacy agency. 40 CFR 141.81(b) and 141.82(g). Systems deemed to have OCCT without the installation of corrosion control treatment are not subject to this requirement. However, they are required to notify the primacy agency in writing of any upcoming changes in treatment or source and request that the primacy agency modify its determination of the OCCT and WQPs applicable to the system. The primacy agency must then review and approve the change and designate OCCT and WQPs prior to its implementation by the system. 141.81(b)(3). Similarly, systems subject to reduced monitoring or monitoring waivers must notify the primacy agency of any upcoming changes in treatment or source and the primacy agency must subsequently review and approve it. EPA recommends that systems that are not subject to a notification requirement also notify the primacy agency prior to the addition of a new source or treatment and request the primacy agency to modify its determination of the optimal corrosion control and WQPs applicable to the system.

Due to the unique characteristics of each PWS (e.g., source water, existing treatment processes, distribution system materials) it is critical that public water systems, in conjunction with their primacy agencies and, if necessary, outside technical consultants, evaluate and address potential impacts resulting from treatment and/or source water changes. It is also critical for public water systems to conduct ongoing monitoring to ensure compliance with OCCT prior to, during and after a source or treatment change. The rearrangement of a system's existing configuration may trigger the need for OCCT adjustments and establishment of appropriate WQPs. Primacy agencies should work with systems that plan to disconnect from a supplier that had installed corrosion control treatment to determine the OCCT for the new source and establish WQPS for that treatment instead of using the OCCT and WQPs established for the previous source. This will allow a system that ceases to purchase treated water to stay in compliance with any applicable requirements pertaining to OCCT and ensure protection of public health during and after the change in source. EPA has developed a guidance manual[2] specifically focusing on evaluation of corrosion control treatment options and optimization of full-scale treatment to assist water systems and primacy agencies with these efforts. EPA is currently preparing an updated version of the manual, which we anticipate will be released in February 2016.

The key to identifying and mitigating potential problems is to ensure effective collaboration between the public water system and the primacy agency. Corrosion control treatment can come in many forms. For this reason, it is important to conduct a system-wide assessment prior to any source water and/or treatment modifications and to identify existing or anticipated water quality, treatment or operational issues that may interfere with or limit the effectiveness of corrosion control treatment optimization or re-optimization.

If you have additional questions or concerns, please contact me or have your staff contact Maria Lopez Carbo, Chief of the Protection Branch, in the Office of Ground Water and Drinking Water, at lopez-carbo.maria@epa.gov.

---

[2] U.S. Environmental Protection Agency. *Lead and Copper Rule Guidance Manual, Volume II: Corrosion Control Treatment.* Office of Water. EPA 811-B-92-002. 1992. Available at: http://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=91019DM4.txt.

STATE OF MICHIGAN

September 10, 2015

Michigan Department of Environmental Quality
Executive Division
DEQ Director: Dan Wyant
P.O. Box 30473
Lansing, MI 48909-7973

Director Wyant,

In light of recently released findings by the American Civil Liberties Union, independent researchers and a troubling interim U.S. Environmental Protection Agency memo from June, we are requesting additional answers about the safety and treatment of the City of Flint's water.

Several disturbing points have been raised and we have a number of urgent questions, including:

- **When did the MDEQ become aware of the June 24, 2015, interim EPA memo and whom was it shared with?**
  - Which Flint city officials also received this information?
  - Why was the memo not immediately shared with the public?
  - What response did MDEQ have to the EPA concerns raised in the memo?
  - Were any actions taken by the MDEQ as a result of the issues mentioned in the memo?
  - What steps, if any, were taken to determine the validity of the Virginia Tech study?

- **Please explain why the pre-flushing method of sampling was used in this instance.**
  - Is it the same method that is applied to all sampling or does the agency have the discretion to decide?
  - Who is responsible for making the decision to pre-flush?
  - The EPA memo references the Lead Copper Rule requirement that systems greater than 50,000 users maintain "corrosion control treatment." As the regulator, why did the MDEQ choose not to enforce that standard?
  - The EPA recommends allowing water to rest for at least six hours, but no more than 12 hours, before taking a sample. On MDEQ's Web site, it suggests flushing the line for five minutes before the six-hour rest. How did the department arrive at this method?

- According to a July 9, 2015, article on DeadlineDetroit.com, "Scary: Leaded Water and One Flint Family's Toxic Nightmare,"

  "'The EPA offered Flint officials the use of agency experts to help get the situation under control,' said Del Toral, but added that, to his knowledge, the city has so far declined all help.

  LeeAnne Walters said that when she asked why city officials weren't taking the EPA's offer of assistance, she was told, "We don't need it."

STATE OF MICHIGAN

Flint spokesman Lorenz, on the other hand, maintained "the city continues to work closely with the MDEQ and the EPA Regional Office."

- Who refused the EPA's offer of expert assistance and why?

- **Is the damage done to the pipes (as described in the EPA report) accurate?**
  - If yes, will damaged pipes continue to leach lead or will properly treated water safely reach consumers?
  - What is the plan and timeline to address it?

- **And most importantly, what can be done immediately to ensure safe, affordable drinking water for the citizens of Flint?**

Many of the decisions that led to the current situation occurred while a state-appointed manager was in control and MDEQ personnel were consulted about testing methods and how to address the situation. In addition, MDEQ also encouraged the method of water testing used by Flint officials. We believe that there is a heightened obligation by the state to make this right.

Due to the serious public health threats of this situation, we respectfully request a response to these matters by Monday, September 14, 2015.

We will do our best to accommodate meeting requests, if necessary, but would appreciate written responses to the above questions so that we can make informed decisions swiftly to address these serious concerns.

Sincerely,

Jim Ananich
Senate Democratic Leader
District 27

Sheldon Neeley
State Representative
District 34

Phil Phelps
State Representative
District 49

cc:
U.S. Representative Dan Kildee
Mayor Dayne Walling, City of Flint
Howard Croft, City of Flint
Susan Hedman, EPA
Thomas Poy, EPA
Michael Schock, EPA-ORD
Darren Lytle, EPA-ORD
Denise Fortin, EPA
Liane Shekter-Smith, MDEQ
Pat Cook, MDEQ
Stephen Busch, MDEQ
Brad Wurfel, MDEQ
Marc Edwards, Virginia Tech

Flint WTP 399 Permitting History – DRAFT

June 26, 2013

Meeting at WTP with Flint and KWA officials
Reviewed current WTP operations and upcoming test run
Discussed short-term/long term objectives
- WTP hydraulics
- Treatment goals
- Residuals
- Electrical redundancy
- Job duties

GCDC/Flint emergency interconnect

July 10, 2013

Visit to WTP to observe treatment plant test-run
Plan to introduce softening in this run
Plan for meeting with consultant to discuss additional WTP improvements needed for short term and long term op.

August 2013 – Received proposed scope of upgrades to the Flint WTP, based from the July 2011 report

August 27, 2013

Meeting at WTP with consultant to discuss scope of upgrades needed for both phases – Phase 1 (short term op. from Flint River) and Phase 2 (long-term op. from KWA)
Engineering design for specific improvements: 30-day supply, ele. Redundancy, new pumps/controls, lime sludge disposal options, additional disinfection, piping changes.

Leads to developing draft plans and specs

Nov 5, 2013

Meeting with city and consultant to discuss electrical redundancy and lime sludge disposal in more detail. Permitting of lime sludge disposal with the need to

upgrade the Bray Road lagoon site under the Act 399 permit was also discussed. Meeting with EM set for the following week.

Nov 13, 2013

EM pre-meeting - draft plans/specs for WTP upgrades are being prepared
Discussed timing of review/comments/ issuance of final plans – CP and construction scheduling. 2 permits to be issued (WTP, lime sludge disposal at Bray Road) Improvements include 30-day chem storage, midpoint CL2, electrical upgrades, high service pumping improvements, lime sludge disposal.

Meeting with EM –

Final approval to use WTP for continuous operation is based on permit issuance
Design/plans/bids to be submitted to DEQ
Separate permits to cover interim improvements (River) and permanent improvements (River and KWA).

Jan 2014 – March 2014

Draft plans/specifications – final plans/specifications submitted to DEQ for review, comment, and approval.

2/27/14 – DEQ provides comments to consultant on draft WTP submittal
3/19/14 – DEQ provides second set of comments to consultant of revised WTP improvements submittal
3/21/14 – DEQ provides comments to consultant on Bray Road sludge Lagoon submittal
4/3/14 - DEQ provides final comments to facilitate submittal of plans and specs acceptable for issuance of Act 399 permit

3/31/14

Meeting with consultant in Lansing to discuss last minute revisions to address storage of lime sludge at the Bray Road lagoon.
Discussed WTP project schedule, timing of work following issuance of Act 399 permit, operational oversight (number of operators/shifts). Potential start-up date. Confirm delivery of final plans/specs. Preparation of new monitoring schedule.

4/8/14 –

Act 399 permit issued for the WTP improvements and the Bray Road sludge lagoon upgrades.

PERMIT APPLICATION FOR WATER SUPPLY SYSTEMS

(CONSTRUCTION - ALTERATION - ADDITION OR IMPROVEMENT) AS DESCRIBED HEREIN

Required under the Authority of 1976 PA 399, as amended

This application becomes an Act 399 Permit only when signed and issued by authorized Michigan Department of Environmental Quality (DEQ) Staff. See instructions below for completion of this application.

1. **Municipality or Organization, Address and WSSN** that will own or control the water facilities to be constructed. This permit is to be issued to: **WSSN:**	Permit Stamp Area (DEQ use only)	
2. **Owner's Contact Person** (provide name for questions): Contact: Title: Phone:		
3. **Project Name** (Provide phase number if project is segmented):	4. **Project Location** (City, Village, Township):	5. **County** (location of project):

ISSUED UNDER THE AUTHORITY OF THE DIRECTOR OF THE DEPARTMENT OF ENVIRONMENT QUALITY

cc:

Issued by: _____

Reviewed by: _____

☐ **If this box is marked see attached special conditions.**

Instructions: Complete items 1 through 5 above and 6 through 21 on the following pages of this application. Print or type all information except for signatures. Mail completed application, plans and specifications, and any attachments to the DEQ District Office having jurisdiction in the area of the proposed construction.

Please Note:

a. This **PERMIT** only authorizes the construction, alteration, addition or improvement of the water system described herein and is issued solely under the authority of 1976 PA 399, as amended.
b. The issuance of this **PERMIT** does not authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other DEQ permits, or approvals from other units of government as may be required by law.
c. This **PERMIT** expires two (2) years after the date of issuance in accordance with R 325.11306, 1976 PA 399, administrative rules, unless construction has been initiated prior to expiration.
d. Noncompliance with the conditions of this permit and the requirements of the Act constitutes a violation of the Act.
e. Applicant must give notice to public utilities in accordance with 1974 PA 53, (MISS DIG), being Section 460.701 to 460.718 of the Michigan Compiled Laws, and comply with each of the requirements of that Act.
f. All earth changing activities must be conducted in accordance with the requirements of the Soil Erosion and Sedimentation Control Act, Part 91, 1994 PA 451, as amended.
g. All construction activity impacting wetlands must be conducted in accordance with the Wetland Protection Act, Part 303, 1994 PA 451, as amended.
h. Intentionally providing false information in this application constitutes fraud which is punishable by fine and/or imprisonment.
i. Where applicable for water withdrawals, the issuance of this permit indicates compliance with the requirements of Part 327 of Act 451, Great Lakes Preservation Act.

6. **Facilities Description** – In the space below provide a detailed description of the proposed project. Applications without adequate facilities descriptions **will be returned**. SEE EXAMPLES BELOW. Use additional sheets if needed.

EXAMPLES – EXAMPLES – EXAMPLES – EXAMPLES – EXAMPLES – EXAMPLES	
Water Mains	500 feet of 8-inch water main in First Street from Main Street north to State Street. OR 250 feet of 12-inch water main in Clark Road from an existing 8-inch main in Third Avenue north to a hydrant.
Booster Stations	A booster station located at the southwest corner of Third Avenue and Main Street, and equipped with two, 15 Hp pumps each rated 150 gpm @ 200 feet TDH. Station includes backup power and all other equipment as required for proper operation.
Elevated Storage Tank	A 300,000 gallon elevated storage tank located in City Park. The proposed tank shall be spherical, all welded construction and supported on a single pedestal. The tank shall be 150 feet in height, 40 feet in diameter with a normal operating range of 130 – 145 feet. The interior coating system shall be ANSI/NSF Standard 61 approved or equivalent. The tank will be equipped with a cathodic protection system, and includes a tank level control system with telemetry.
Chemical Feed	A positive displacement chemical feed pump, rated at 24 gpd @ 110 psi to apply a chlorine solution for Well No. 1. Chlorine is 12.5% NaOCL, ANSI/NSF Standard 60 approved and will be applied at a rate of 1.0 mg/l of actual chlorine.
Water Supply Well	Well No. 3, a 200 foot deep well with 170 feet of 8-inch casing and 30 feet of 8-inch, 10 slot screen. The well will be equipped with a 20 Hp submersible pump and motor rated 200 gpm @ 225 feet TDH, set at 160 feet below land surface.
Treatment Facilities	A 5 million gpd water treatment plant located at the north end of Second Avenue. The facility will include 6 low service pumps, 2 rapid mix basins, 4 flocculation/sedimentation basins, 8 dual media filters, 3 million gallon water storage reservoir and 6 high service pumps. Also included are chemical feed pumps and related appurtenances for the addition of alum, fluoride, phosphate and chlorine.

General Project Information – Complete all boxes below.

7. Design engineer's name, engineering firm, address, phone number, and email address:	8. Indicate who will provide project construction inspection: ☐ Organization listed in Box 1. ☐ Engineering firm listed in Box 7. ☐ Other - name, address, and phone number listed below.

9. Is a basis of design attached?
☐YES ☐NO

If no, briefly explain why a basis of design is not needed.

10. Are sealed and signed engineering plans attached?
☐YES ☐NO

If no, briefly explain why engineering plans are not needed.

11. Are sealed and signed construction specifications attached?
☐YES ☐NO

If specifications are not attached, they need to be on file at DEQ.

12. Were Recommended Standards for Water Works, Suggested Practice for Water Works, AWWA guidelines, and the requirements of Act 399 and its administrative rules followed?
☐YES ☐NO

If no, explain which deviations were made and why.

13. Are all coatings, chemical additives and construction materials ANSI/NSF or other adequate 3rd party approved?
☐YES ☐NO

If no, describe what coatings, additives or materials did not meet the applicable standard and why.

14. Are all water system facilities being installed in the public right-of-way or a dedicated utility easement? (For projects not located in the public right-of-way, utility easements must be shown on the plans.)
☐YES ☐NO

If no, explain how access will be obtained.

15. Is the project construction activity within a wetland (as defined by Section 324.30301(d)) of Part 303, 1994 PA 451?
☐YES ☐NO

If yes, a wetland permit must be obtained.

16. Is the project construction activity within a 100-year floodplain (as defined by R 323.1311(e)) of Part 31, 1994 PA 451, administrative rules?
☐YES ☐NO

If yes, a flood plain permit must be obtained.

17. Is the project construction activity within 500 feet of a lake, reservoir, or stream?
☐YES ☐NO

If yes, a Soil and Erosion Control Permit must be obtained or indicate if the owner listed in box 2 of this application is an Authorized Public Agency (Section 10 of Part 91, 1994 PA 451) ☐ Owner is APA.

18. Will the proposed construction activity be part of a project involving the disturbance of five (5) or more acres of land?
☐YES ☐NO

If yes, is this activity regulated by the National Pollutant Discharge Elimination System storm water regulations?
☐YES: NPDES Authorization to discharge storm water from construction activities must be obtained.

☐NO: Describe why activity is not regulated:

Please call 517-241-8993 with questions regarding the applicability of the storm water regulations.

19. Is the project in or adjacent to a site of suspected or known soil or groundwater contamination?
☐YES ☐NO

If yes, attach a copy of a plan acceptable to the DEQ for handling contaminated soils and/or groundwater disturbed during construction. Contact the local DEQ district office for listings of Michigan sites of environmental contamination.

20. IF YOU ARE A CUSTOMER/WHOLESALE/BULK PURCHASER, COMPLETE THE FOLLOWING

1) Name and WSSN of source water supply system (seller) _____

2) Does the water service contract require water producer/seller to review and approve customer/wholesale/bulk purchaser water system construction plans?
☐YES ☐NO

If yes to #2, the producer/seller approval letter must be attached when submitted to DEQ.

21. **Owner's Certification** The owner of the proposed facilities or the owner's authorized representative shall complete the owner's certification. It is anticipated that the owner will either be a governmental agency (city, village, township, county, etc.) or a private owner (individual, company, association, etc.) of a Type I public water supply.

OWNER'S CERTIFICATION

I, _____ (name), acting as the _____ (title/position) for
(print) (print)

_____ (entity owning proposed facilities) certify that this project has
(print)

been reviewed and approved as detailed by the Plans and Specifications submitted under this application, and is in compliance with the requirements of 1976 PA 399, as amended, and its administrative rules.

_____ _____ _____
Signature* Date Phone

*Original signature only, no photocopies will be accepted.

PROJECT BASIS OF DESIGN – FOR WATER MAIN PROJECTS

PROJECT NAME: _____

For this PROJECT the following information must be provided per Act 399 unless waived by the Department. For projects other than water main installation, or if additional space is needed, attach separate sheet(s) with detailed Basis of Design calculations.

A. A general map of the initial and ultimate service areas
☐Included on engineering plans ☐Attached separately

B. Number of service connections served by this permit application _____

C. Total number of service connections ultimately served by entire project _____

D. Residential Equivalent Units (REUs) served by this permit application _____

E. Total Residential Equivalent Units (REUs) ultimately served by entire project _____

F. Water flow rates for proposed project based on REUs listed in "D' and "E" above

1. Initial design average day flow (mgd) _____
2. Initial design maximum day flow (mgd) _____
3. Total design average day flow (mgd) _____
4. Total design maximum day flow (mgd) _____
5. Required fire flows: (1) _____ gpm for _____ hours

G. Actual flows and pressures of existing system at the connection point(s) (2)

_____ gpm at _____ psi
_____ gpm at _____ psi
_____ gpm at _____ psi
_____ gpm at _____ psi

H. Estimated minimum flows and pressures within the proposed water main system (3) _____ gpm at _____ psi

(1) Every water system must decide what levels of fire fighting flows they wish to provide. Fire flow should be appropriate for the area (residential, commercial, industrial) being served by the project. Typical fire flow rates can be obtained from the water supply, local fire dept., ISO or AWWA. The water system must then be designed to be able to provide the required fire flows while maintaining at least 20 psi in all portions of the distribution system.

(2) Flows and pressures at the connection points must be given to determine if the existing water main(s) are able to deliver water to the new service area. These numbers can be obtained from a properly modeled and calibrated distribution system hydraulic analysis or hydrant flow tests performed in the field. If more than one connection is proposed, list as needed.

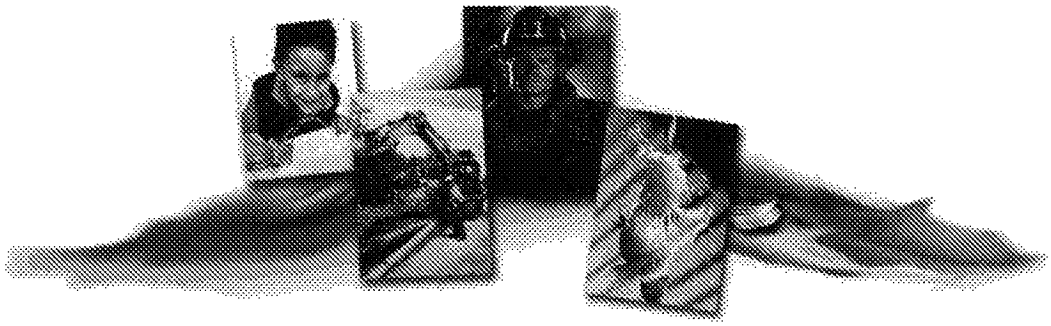
(3) List what the estimated minimum flows can be expected in the proposed water mains based on estimated water demands, head losses, elevation changes and other factors that may affect flows, such as dead end mains.

City of Flint Water
Action Steps for Week of November 2-6

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
1.	Conduct After Action Plan	DEQ	George Krisztian	Meeting held on 10/29/15 to discuss time line
2.	Introduce legislative changes to Part 54 of NREPA – Drinking Water Revolving Loan Fund	DEQ, Treasury, and EPA	Maggie Pallone George Krisztian Sonya Butler	Draft language submitted to Maggie Pallone for review
3.	Assist After Action Review Panel	DEQ	Madhu Anderson George Krisztian Karen Tommasulo	Panel created and press release issued on 10/21/15
4.	Staff hiring plan	DEQ	Jim Sygo Maggie Pallone George Krisztian	Negotiations underway to contract with the Genesee County Health Department
5.	Finalize fiscal year 2017 budget request	DEQ	Maggie Pallone George Krisztian	
6.	Meeting(s) with school staff/management	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	A summary report for Freeman Elementary School has been drafted
7.	Contact DHHS regarding lead education material for schools; provide information as requested by DHHS	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	Meeting held on 10/27/15; action items created
8.	Follow up with city of Flint regarding corrosion control treatment and their plans to address requirements and options provided for in 10/30/15 DEQ letter	DEQ and EPA	Jim Sygo Steve Busch Pat Cook Mike Prysby	

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
9.	E-mail city of Flint regarding timing to install corrosion control now that the construction permit has been issued	DEQ	Jim Sygo Steve Busch Pat Cook Mike Prysby	
10.	Review Monthly Operation Reports for Standby Operation of Flint Water Treatment Plant with city of Flint; draft letter to city of Flint documenting Standby Operation requirements	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	
11.	Work with Karegnondi Water Authority (KWA) and other agencies to address bottleneck issues; check weekly for status update	DEQ and KWA	Jim Sygo Steve Busch Pat Cook Mike Prysby	Issues regarding soil erosion controls during construction are being addressed
12.	Continue evaluating city of Flint Service Line Record status and comparison to sampling pool	DEQ and Flint	Jim Sygo Steve Busch Pat Cook Mike Prysby	Cross-referencing process has begun
13.	Provide DHHS with any available cross-reference information regarding lead service lines and plumbing materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	
14.	Develop childcare facility guidance or review DHHS-related materials	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	Meeting held on 10/27/15; DHHS to provide materials
15.	Develop draft sampling protocol for residential exposure assessment for DHHS	DEQ and DHHS	Jim Sygo Steve Busch Pat Cook Mike Prysby	

Step No.	Action Step	Involved Parties	DEQ Point(s) of Contact	Status
16.	Make progress on drafting a generic school sampling guidance document for statewide distribution; target audience: schools served by municipal water	DEQ and LARA	Jim Sygo Steve Busch Richard Benzie	Final draft of school sampling protocol has been written and is awaiting final review
17.	Attend 11/5/15 meeting arranged by DHHS regarding residential elevated blood lead investigations and water testing	DEQ and DHHS	Jim Sygo George Krisztian Steve Busch	



Assisting Schools and Child Care Facilities in Addressing Lead in Drinking Water

American Water Works Association

The Authoritative Resource on Safe Water℠

Advocacy
Communications
Conferences
Education and Training
Science and Technology
Sections



American Water Works Association

The Authoritative Resource on Safe Water℠

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ACKNOWLEDGEMENTS

Workgroup

Traci Case, AwwaRF
Gary Burlingame, Philadelphia Water Department
David Denig-Chakrof, Madison Water
Stephen Estes-Smargiassi, MWRA
Dixie Fanning, Hanahan Commissioners of Public Works.
Michael Hotaling, Newport News Water
Ron Hunsinger, East Bay MUD
Maggie Rodgers, Cleveland Water
Jeff Swertfeger, Cincinnati Water
Jonathan Yeo, MWRA

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Water Utility Council

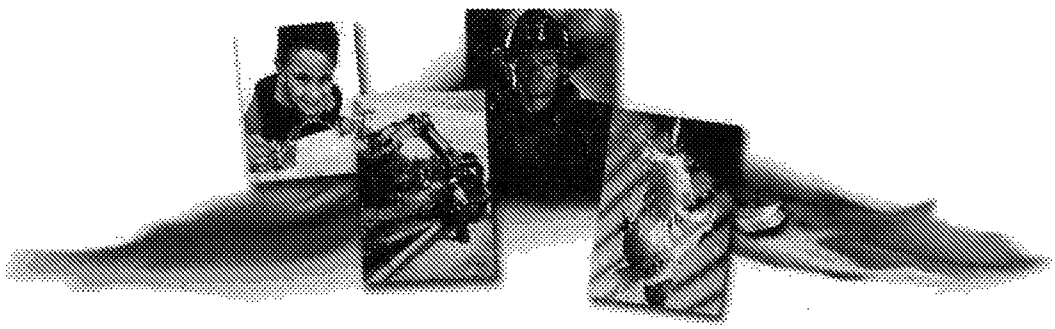
Julius Ciaccia, Cleveland Division of Water-Chair
Dennis Diemer, East Bay Municipal Utility District – Vice Chair
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Hamlet Barry, Denver Water
Joseph Bella, Passaic Valley Water Commission--AMWA/Representative
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Funding for this project was provided by the Water Industry Technical Action Fund (WITAF). WITAF is administered by AWWA and is funded through member dues. WITAF funds information collection and analysis and other activities in support of sound and effective legislation, regulation, and drinking water policies and programs.



Assisting Schools and Child Care Facilities in Addressing Lead in Drinking Water

EXECUTIVE SUMMARY

The American Water Works Association (AWWA) is committed to providing information that helps water suppliers in their role as guardians of public health. Exposure to lead at schools and child care facilities is an issue of growing concern to EPA and some states.

Lead is a significant public health issue. Over the past several decades significant steps were taken to reduce lead from a variety of sources: fuel, paint, air pollution, and plumbing components. Drinking water utilities are also doing their part to reduce lead exposure. Community water systems actively manage and monitor the drinking water they provide to control corrosivity, and thereby reduce the potential to leach lead from household plumbing. Some water systems take additional measures like purchasing low-lead / no-lead distribution system components and others have proactive lead service line replacement programs. Steps also have been taken to identify and reduce lead exposure in schools, but recent events suggest that additional attention may be appropriate in some school and child care facilities.

School and child care administrators are responsible for limiting lead exposure in their facilities, but some water suppliers may be in a position to provide valuable assistance by working with local health departments, schools and child care facilities. We hope you find the information provided in this document helpful as you consider your utility's ability to inform or assist school and child care facilities in the communities you serve.

The following compares and contrasts EPA's guidance to schools and child care facilities under the Lead Contamination Control Act (LCCA) and the Lead and Copper Rule (LCR). It also provides a brief overview of what is entailed in monitoring for lead in schools and child care facilities and the process for undertaking remediation. This report describes a range of assistance utilities can provide to schools and child care facilities based on local needs and resources. Most importantly, it identifies key points of coordination, and provides basic information that the utility can use in communicating about lead in drinking water.

While, this report was prepared with a focus on U.S. regulations, the report premise and suggestions are generally applicable. We hope that this document will be useful to our water supplier members in Canada, Mexico, and other countries.



Assisting Schools and Child Care Facilities in Addressing Lead in Drinking Water

INTRODUCTION

Lead is a significant public health issue, and it is not only a drinking water issue. Other potentially more significant sources of lead include paint and dust. In addition, schools face numerous other environmental challenges. Consequently, EPA and the Department of Education encourage schools to think of building design, maintenance, and remediation holistically (http://cfpub.epa.gov/schools/). While schools and child care administrators bear the responsibility for minimizing lead exposure in their facilities, some water suppliers may be in a position to provide valuable assistance by collaborating with local health departments, schools and child care facilities to help facility administrators better understand how to monitor for and manage lead in drinking water at their facilities.

Overview

The issue of lead in drinking water has returned to the national spotlight after a decade of relative calm. Most water utilities have been very successful in implementing effective corrosion control programs and complying with the requirements of the Lead and Copper Rule (LCR). In spite of this, utilities are facing renewed regulatory, legislative and public scrutiny, attributable largely to the discovery of elevated levels of lead in tap water in a few high-profile communities. Lead exposure in schools is only one aspect of this scrutiny, but it has received considerable attention.

The reduction of lead exposure in schools and child care facilities is the responsibility of the administrators of those facilities. This responsibility includes, but is not limited to, minimizing lead levels in the drinking water system within the facility. Water utilities are not legally responsible for the lead levels in the water systems of schools and child care facilities unless the facility maintains its own supply and is classified by the state as a public water system.

A lead-in-drinking-water problem may be identified by a community's health department, school system, an individual school or child care facility, or the general public. By being prepared for this issue, the utility can better respond to inquiries and, where appropriate, develop more effective collaborations with schools and child care facility managers.

Health Effects

Lead builds up in the body over time and can cause damage to the brain, red blood cells and kidneys. According to the Centers for Disease Control (CDC), of all people, young children face the most danger from exposure to lead because their growing bodies absorb lead more easily than adults' bodies. For children 5 years old and younger, lead levels of 10 micrograms or more in a deciliter of blood can damage a child's ability to learn.

How Lead Can Get Into Drinking Water

A child's greatest exposure to lead is typically from contaminated paint, dirt and dust. However, lead in drinking water can contribute to overall lead exposure. Lead contamination is rarely found in sources of drinking water such as rivers, wells and reservoirs at significant concentrations. It's almost never present in water leaving a treatment plant or traveling through mains. However, lead enters drinking water as a result of corrosion, as water comes into contact with lead pipes, lead service connections, solder and plumbing fixtures.

Community water systems are required under the LCR to control the corrosivity of water. Ninety-six percent of community water systems comply with the LCR.[1]

Lead may be present in school and child care plumbing systems, water coolers, bubblers, and drinking fountains. The amount of lead found in the tap water depends on the plumbing materials present, the pH of the water and other water quality factors.

Recognizing the importance of minimizing lead exposure in schools and child care facilities, the U.S. Congress passed the Lead Contamination Control Act (LCCA) of 1988. The LCCA provided information for repairing or replacing lead-lined water coolers and guidance to schools and child care facilities on methods to test and reduce lead exposure in drinking water.

The LCCA caused many school systems and child care facilities to evaluate lead in water coolers and plumbing during the early 1990s, and the LCCA remains the regulatory vehicle for management of lead in drinking water in these facilities. Compliance with the LCCA on the part of schools is voluntary, in sharp contrast to the mandated provisions of the Lead and Copper Rule (LCR), which applies to public water systems. Differences between the LCCA guidance and the LCR requirements are a source of confusion, and, at times, misinformation in the media and the public. It is essential that utility personnel have a thorough understanding of the differences between the two rules and an awareness of lead in drinking water issues in schools and child care facilities in their communities. Toward that end, this document:

1. Summarizes the provisions of the LCCA guidance and the LCR requirements and highlights the distinguishing differences.

2. Describes the steps school systems and child care facilities may take to effectively manage lead levels in the water supplies in their facilities.

3. Provides drinking water suppliers with information and tools they may use to assist school and child care administrators in addressing lead in drinking water.

[1] Summary of lead action level exceedances for medium (3,300-50,000) and large (>50,000) public water systems, USEPA, http://www.epa.gov/safewater/lcrmr/lead_data.html



REGULATORY REQUIREMENTS
A Comparison of the Lead Contamination Control Act Guidance Manual and Lead and Copper Rule Requirements

Regulatory Background

The Safe Drinking Water Act (SDWA) is the legislation that addresses lead in public drinking water. The LCCA and the LCR work together to minimize lead in drinking water. The goal of the LCR is to minimize lead and copper in drinking water, primarily by reducing water corrosivity. The LCR sets specific requirements for public drinking water systems. This is in sharp contrast to the LCCA, which addresses lead exposure at individual outlets in schools. The LCCA resulted in federal guidance applicable to schools and child care facilities, but it did not set regulatory requirements.

EPA Guidance Under SDWA and LCCA

Failing to meet requirements specified in state and federal regulations results in violations, and their associated fines and penalties. In addition to setting regulatory requirements EPA provides technical information and advice through guidance. EPA guidance is not compulsory, but it is provided with the intent of assisting the recipients to achieve national public health objectives and where there are related regulatory requirements, achieve compliance with those requirements.

EPA is now in the process of updating its guidance documents for public drinking water systems (i.e., LCR guidance), and for schools and child care facilities (i.e., LCCA guidance).

Some states have adopted rules and requirements beyond these national statutes and rules. Consequently, the primacy agency for state rules and, in most instances the local health departments, are the critical points of contact on the issue of lead in schools.

The Lead Contamination Control Act

The LCCA was signed into law in November 1988. This law was intended to reduce exposure to lead from all sources, including lead in school drinking water supplies. The LCCA required:

1. A recall of drinking water coolers with lead-lined tanks;
2. Prohibition of the sale and manufacturing of any drinking water cooler that was not "lead-free"[2];
3. Development of guidance to educational agencies and schools including child care facilities on sampling and testing protocols; and

[2] LCCA defined "lead-free" to mean "not more than 8 percent lead; except that no drinking water cooler which contains any solder, flux, or storage tank interior surface which may come in contact with drinking water shall be considered lead free, if the solder flux, or storage tank interior surface contains more than 0.2 percent lead."

A school is ...

Section 1461 of SDWA defines "school" to mean generally any elementary school or secondary school and any kindergarten or day care facility.

(3) Local educational agency. – The term "local educational agency" means-
(A) any local educational agency as defined in section 198 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 3381),
(B) the owner of any private, nonprofit elementary or secondary school building, and
(C) the governing authority of any school operating under the defense dependent's education system provided for under the Defense Dependent's Education Act of 1978 (20 U.S.C.921 and following). (SDWA, Section 1461, Definitions)

4. Public notification of the availability of lead testing results.

In 1994, EPA developed a guidance manual entitled "*Lead in Drinking Water in Schools and Nonresidential Buildings*". The Guidance Manual offers: background information about the sources and health effects of lead; descriptions of how lead gets into drinking water; a description of the regulation of lead in drinking water; guidance for developing plumbing profiles and sampling plans, and remedies when elevated lead levels are observed. The Guidance Manual is available on the EPA Office of Ground Water and Drinking Water's website at: www.epa.gov/safewater/Pubs.

"Schools" vs "Child Care Facilities"

Sampling protocols for lead in drinking water at child care facilities are the same as those for schools.

EPA required states to develop water-testing programs for schools. However, in 1996, a federal court determined that such a federal regulatory program couldn't be imposed on states. EPA interpreted this decision as prohibiting the agency from mandating water testing in schools. Consequently, where school and child care facility lead sampling is done, it is voluntary unless it is undertaken to comply with state regulations. In the spring and summer of 2004, EPA compiled information on individual state LCCA activities. This information is available at http://www.epa.gov/safewater/lcmr/.

Sampling Protocol

The LCCA guidance includes a sampling protocol, which **recommends** collection of a 250 milliliter (mL) "morning, first-draw water sample" (e.g., sampling after an 8 to 18-hour stagnation period). In so doing, the LCCA guidance targets the "first draw" water from the sampling point in an attempt to represent worst-case water consumed by students. This contrasts with the LCR sampling protocol, which **requires** collection of a one-liter "first-draw" sample (e.g., sampling after a 6- to 8-hour stagnation period). The LCR samples represent the contribution of internal plumbing to lead levels. The difference in the LCCA guidance and LCR sampling protocols can lead to a great deal of confusion and thereby increase the challenge of accurately describing the resulting data to decision-makers and stakeholders.

Additional Samples If Initial Samples are Elevated

The LCCA guidance recommends that samples be taken after a 30-second flush at those sampling locations with initial lead levels greater than 0.020 mg/L (20 ppb). Most states have adopted the 0.020 mg/L (20 ppb) recommended trigger level

for follow-up actions, while several have opted for 0.015 mg/L (15 ppb) (the LCR Action Level). Consequently, it is important to understand how individual states administer their programs and to maintain an open dialogue with state regulators regarding program implementation.

Public Education

When schools and child care facilities conduct monitoring for lead in drinking water, EPA recommends that they:

1. Make available a copy of the sampling results for "inspection by the public, including teachers, other personnel, and parents."

2. Notify relevant parent, teacher, and employee organizations that sampling program results are available.

Table 1 on page 7 briefly summarizes the provisions of the LCCA guidance; Appendix A provides a more detailed summary.

Remediation

Addressing lead in drinking water may require both short- and long-term solutions. Decisions for one remedy over another will be based on such factors as likelihood of success, availability of water, cost, and staffing requirements.

Some examples of remedies are listed in Appendix I. More detailed explanations, including information about advantages and disadvantages, are in EPA's LCCA guidance.

The Lead and Copper Rule

The LCR, finalized in June 1991 and later amended in January 2000, applies to public water systems. Under the LCR, no more than 10 percent of samples from a public water system may exceed the rule's Action Levels, 0.015 mg/L (15 ppb) for lead and 1.3 mg/L for copper.

When the Action Level is exceeded, specific follow-up steps include corrective action to implement optimized corrosion control and public notification. The LCR provisions apply to water suppliers that serve schools and child care facilities. If an individual school or child care facility supplies or treats its own water supply, it is considered a public water system and must comply with the rule provisions. Additional information about the LCR is available on the EPA Office of Ground Water and Drinking Water's website at: http://www.epa.gov/safewater/lead/index.html

At present the LCR is applicable to community water systems and non-transient non-community water systems. Some schools and child care facilities that have their own water supply are, therefore permitted public water systems. In these instances, the facility is also subject to the applicable provisions of the LCR.

The LCCA guidance targets material remediation

Types of Public Water Systems

Community Water System (CWS): A public water system (PWS) that supplies water to at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

Non-Transient Non-Community Water System (NTNCWS): A PWS that regularly supplies water to at least 25 of the same people at least six months per year, but not year-round. Some examples are schools, factories, office buildings, and hospitals that have their own water systems.

Transient Non-Community Water System (TNCWS): A PWS that does not regularly serve at least 25 of the same persons over six months per year. Examples are places such as a gas station or campground where people do not remain for long periods of time

while the LCR is focused on reducing the corrosivity of delivered water. These two control strategies complement one another, but their differing approaches may also complicate public education efforts. Table 1 summarizes other distinguishing features of the LCCA guidance and LCR requirements for lead management.

The Lead Ban

Amendments to the Safe Drinking Water Act (SDWA) banned the use of lead pipes, solder, and flux effective June 1986 in drinking water plumbing. Therefore, any plumber, general contractor, etc. who used lead solder, pipe or flux after that date is in violation of federal law.

Prior to the 1996 amendments, the SDWA required faucets and other plumbing fixtures to contain no more than 8 percent lead. The 1996 amendments to the Safe Drinking Water Act (SDWA) required EPA to establish a performance standard to govern the leaching of lead from endpoint devices intended to dispense water for human consumption. The EPA selected Section 9 of *ANSI/NSF Standard 61: Drinking Water System Components-Health Effects* as this performance standard. After August 6, 1998, it was unlawful for any pipe or plumbing fitting or fixture that is not "lead free" to be introduced into commerce.

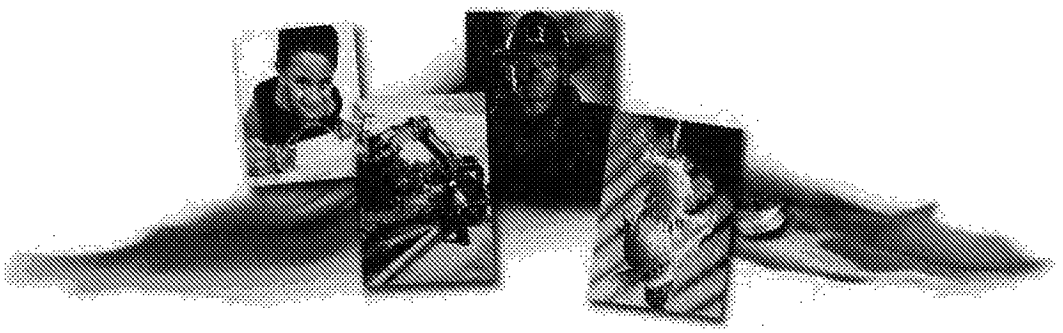
Plumbing Materials

Plumbing materials purchased for use in schools and child care facilities should comply with the lead ban, and meet ANSI / NSF standards or more stringent lead content requirements.

Prior to the 1996 amendments, the Safe Drinking Water Act required faucets and other plumbing fixtures to contain no more than 8 percent lead. The 1996 amendments retained the 8 percent lead content requirement and further mandated that faucets, drinking fountains and other drinking water dispensing devices meet the performance-based lead leaching requirements of ANSI/NSF Standard 61, Section 9.

Table 1. Summary of Distinguishing Features of the Lead Contamination Control Act Guidance and the Lead and Copper Rule Requirements

Feature	Lead Contamination Control Act Guidance	Lead and Copper Rule Requirements
Sampling Sites	Each cold water tap in a facility	Cold water taps in high risk homes/buildings
"First Draw" Sample Size	250 mL	1000 mL
Stagnation Period	Morning, first-draw water sample" (e.g., sampling after an 8 to 18-hour stagnation)	"First-draw" sample (e.g., sampling after a 6- to 8-hour stagnation period)
Action Level	0.020 mg/L at each cold water tap	0.015 mg/L in 90% of taps
Action(s), if Lead Limit Exceeded	Additional samples recommended; suggests remedial measures	Mandatory corrective actions such as public education, lead service line replacement, increased monitoring and corrosion control treatment
Sampling Schedule	None specified	Initially, two 6-month monitoring periods; Reduced monitoring – June through September each year or once per three years
Certified Laboratory Requirement	Yes	Yes
Public Notification Requirements	Make results available in the administrative offices of the local educational agency; must notify parents, teachers, and employee organizations of the availability of results	Must present data in annual Consumer Confidence Report. Full notification required only if Action Level is exceeded.



LEAD IN SCHOOLS AND THE WATER SUPPLIER

Under the LCCA guidance, school and child care administrators are responsible for taking steps to minimize exposure to lead in drinking water at their facilities. These facilities can obtain technical assistance from local health departments, but as the local water supplier, you may be in a position to provide information that facilitates appropriate action in the communities you serve.

Getting Prepared

To communicate effectively with health departments, school, and child care administrators about lead in drinking water, you may choose to first provide a clear presentation of your utility's actions related to this issue. If you effectively demonstrate the steps taken to reduce lead at the tap in the community water supply, you affirm your utility's commitment to public health. You also provide the technical information necessary for future discussions on lead in school drinking water.

Compiling and reviewing the following information is a worthwhile investment of time:

1. Review your utility's LCR compliance status.
    - Do you have a description of your program to maintain optimized corrosion control (OCC)?
    - What are your monitoring requirements and what is your compliance record with the LCR Action Level?
    - When is compliance monitoring occurring?
    - Do you have a summary of pertinent data in an easily-understood format that can be provided to the school or child care facility staff?
2. Review or develop your utility's service line and meter data for discussions with school and child care administrators.
    - Are there lead service lines or compound meters with lead components leading to school or child care facilities?

Determine how the LCCA is administered in your state and locally. In most communities, the local health department is the key agency in identifying and prioritizing risks to public health. It is also the oversight agency most likely to provide direction to schools on lead issues. Opening a discussion with the local health department provides an opportunity to exchange information and identify shared priorities. Key questions include:

1. What is the status of state regulations arising from the LCCA?
2. What actions have been taken to-date?
    - What notifications, requests, or guidance has been distributed to

schools and/or child care facilities?

- What actions are already underway by local school board, town, city or county governing bodies, or the facility administrators?

Communication

When compatible with public health agency activities, utilities may choose to communicate directly about lead in drinking water with schools and child care facilities in communities they serve.

> **Agency Perspective**
>
> Some states are already actively encouraging community water systems to interact with schools and child care facilities. These efforts reflect a national effort by U.S. EPA to promote such local dialogues.

It is important to keep your utility's governing body informed about the issue of lead in drinking water, your utility's compliance record with the LCR, and your state's response to the issue of lead in school and child care drinking water. Also, before assistance is offered, carefully identify the costs and benefits of such assistance and be assured of the governing body's policy and financial support.

In order to help them answer questions from the general public, utility personnel should also be informed about health risks associated with lead in drinking water and your utility's compliance record. Your utility's compliance status should be communicated to customers through your Consumer Confidence Report and other available means (i.e., website, newsletters, etc.).

> **Consumer Confidence Report**
>
> The CCR provides an opportunity to communicate your utility's compliance status to customers.

Planning

Communication efforts on lead in school drinking water require thoughtful planning. The following questions may be helpful in structuring your approach:

1. What is the potential scope of the issue? Is there likely to be a widespread problem with lead in drinking water based on your current water quality, LCR history, status of LCCA activities, the number and age of facilities or other factors?
2. What is the likelihood that your customers understand the issues associated with lead in drinking water?
3. What personnel and informational resources will be needed to assist schools and child care administrators?

Reaching Out

When engaging health departments, schools (public, private, or parochial), and child care facilities on the topic of lead in water, water suppliers should keep in mind that many school systems took action more than a decade ago when the LCCA was first signed into law. If the school or child care facility or system integrated appropriate practices into its operation and maintenance programs, it is less likely to face significant lead challenges.

If a utility decides to reach out to health departments, schools, or child care facilities on the issue of lead in drinking water, a simple phone conversation may be enough to initiate the appropriate action steps. However, a brief letter may be more effective.

Initial letters sent to these facilities and agencies should clearly state the issue at hand and serve to open a dialogue on this issue. A sample letter is provided in Appendix B.

Correspondence with the highest level of authority at the school or child care facility or system usually encourages the widest distribution within the organization. In situations where it is not clear who are the most appropriate recipients, contact

the school or school system. Correspondence is typically most effective if combined with follow-up contact.

Identifying all of the child care facilities in a community can be quite challenging. Appendix C provides several resources that are available to find these facilities.

Identifying Child Care Facilities

State licensing and registration programs for child care providers are the most centralized sources of information on child care facilities.

Examples of Possible Utility Assistance

Utilities have a wide range of expertise and resources available to assist schools and child care facilities in their responsibility to minimize exposure to lead in drinking water. While your utility must decide what level of assistance is appropriate, you may consider a range of opportunities for collaboration. Table 2 on page 12 illustrates a range of possible interactions with schools, child care facilities, and local health departments, but it is by no means all encompassing. Innovative utilities, schools, and local health departments will undoubtedly identify additional ways to work together.

Health Department

Health departments are responsible for balancing risk and costs of reducing risks in their community and may determine that current actions are appropriate. A utility's first contact should be through the Health Department before contacting schools and any future actions should be guided by the Health Department.

Due to the complexity of lead in drinking water issues and the number of facilities that may be involved, utilities may incur significant costs in assisting schools and child care facilities. Before offering assistance, utilities should ensure that their governing boards concur with such commitments.

Table 2: Opportunities for Collaboration

Help the School / Child Care Understand the Source of Lead in Drinking Water
A school or child care facility administrator may benefit from a better understanding of how lead leaches from facility plumbing. As a utility, you may choose to provide information on water quality factors affecting the water's corrosivity. You may also explain your corrosion control program to affirm your utility's commitment to minimizing lead exposure at the tap. Simply providing your Consumer Confidence Report (CCR) may be helpful.

Developing a Sampling Plan
Water quality sampling is a familiar task for drinking water suppliers, but not for most schools and child care facilities. Some utilities have informed appropriate school staff about the critical elements of a sound sampling plan. Those elements include identifying and tracking sample locations, proper timing of sample events, sampling protocols and management of sample results.

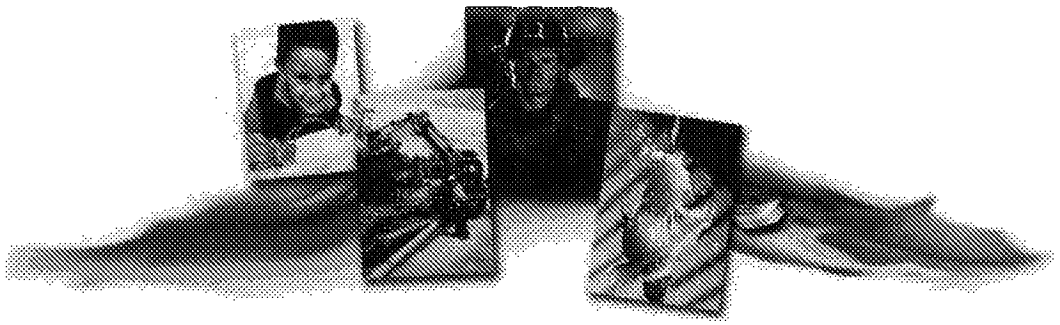
Proper Sample Collection
Proper sampling technique is essential to obtaining correct lead sample results. Some utilities have assisted school systems and child care facilities in proper sampling protocols. This assistance may include direct participation in training events or a train-the-trainer technical assistance strategy.

Laboratory Services
Water suppliers may provide information on lab services needed for processing lead samples. Assistance in this area has taken a number of forms, including explaining the appropriate analytical methods, identifying certified laboratories and assisting in selection of laboratory services. In some cases, utilities have provided analytical services through their in-house laboratories.

Reviewing Results and Options to Control Lead Exposure
As a water supplier, you may have personnel available to interpret sample results and identify cost-effective control solutions. Utility staff is trained in the basic issues of corrosion chemistry and hydraulics. They also have practical experience operating water distribution facilities, flushing pipe networks, installing automated valves, and employing other procedures unfamiliar to most school and child care personnel.

Utility Assistance in a Targeted Evaluation Effort
In school districts with multiple buildings dedicated to teaching, the water utility may offer support in evaluating lead levels in a limited or targeted group of facilities. For example, the utility might help a school system develop a pilot approach to evaluating its facilities. If successful, the school staff would then apply that approach to other facilities. The utility may also assist in identifying the characteristics of buildings that make them especially vulnerable to elevated levels of lead in the drinking water.

Large-Scale Involvement in Lead Action Plan
Depending on local circumstances (especially governance), a water utility may choose to become deeply involved in addressing school system or child care facility lead action plans. For example, the utility may be an active participant in a stakeholder-based school decision-making process that also includes the local health department.



MANAGING LEAD LEVELS AT THE TAP IN SCHOOLS AND CHILD CARE FACILITIES

School and child care facility administrators face a large portfolio of environmental and public health concerns. Consequently, some schools employ comprehensive programs to assure compliance with environmental and public health standards. Lead paint, dust abatement, and other lead exposure reduction measures may already be ongoing through a lead poisoning prevention program. Where possible, lead in drinking water should be managed in the context of a multi-media program. Whether such a program exists or not, steps can be taken to assess lead levels in water at drinking water fountains, bubblers, and other outlets.

School systems and child care facilities that already have taken steps to control lead in their facilities and maintain a regular monitoring program are much better positioned to manage lead in drinking water than those confronting the issue for the first time. Addressing lead in drinking water, when elevated levels are identified within a facility, typically involves an initial investment in physical changes to a facility, the introduction of new maintenance practices, and the establishment of an ongoing monitoring program for lead levels.

A facility with an ongoing lead poisoning prevention program that addresses tap water may need little interaction with its water supplier beyond routine communications. However, a facility in which management of lead exposure has not consistently focused on water may need to initiate an Action Plan and consequently may have a greater interest in interacting with the drinking water utility.

Action Plans are typically initiated in a phased manner, during which the school or child care facility:

1. Reviews previous efforts to remove leaded materials, implement lead control strategies, etc.
2. Conducts targeted monitoring (if recent monitoring data are not available) to determine if lead levels appear to be elevated.
3. Develops a detailed Action Plan based upon available information.

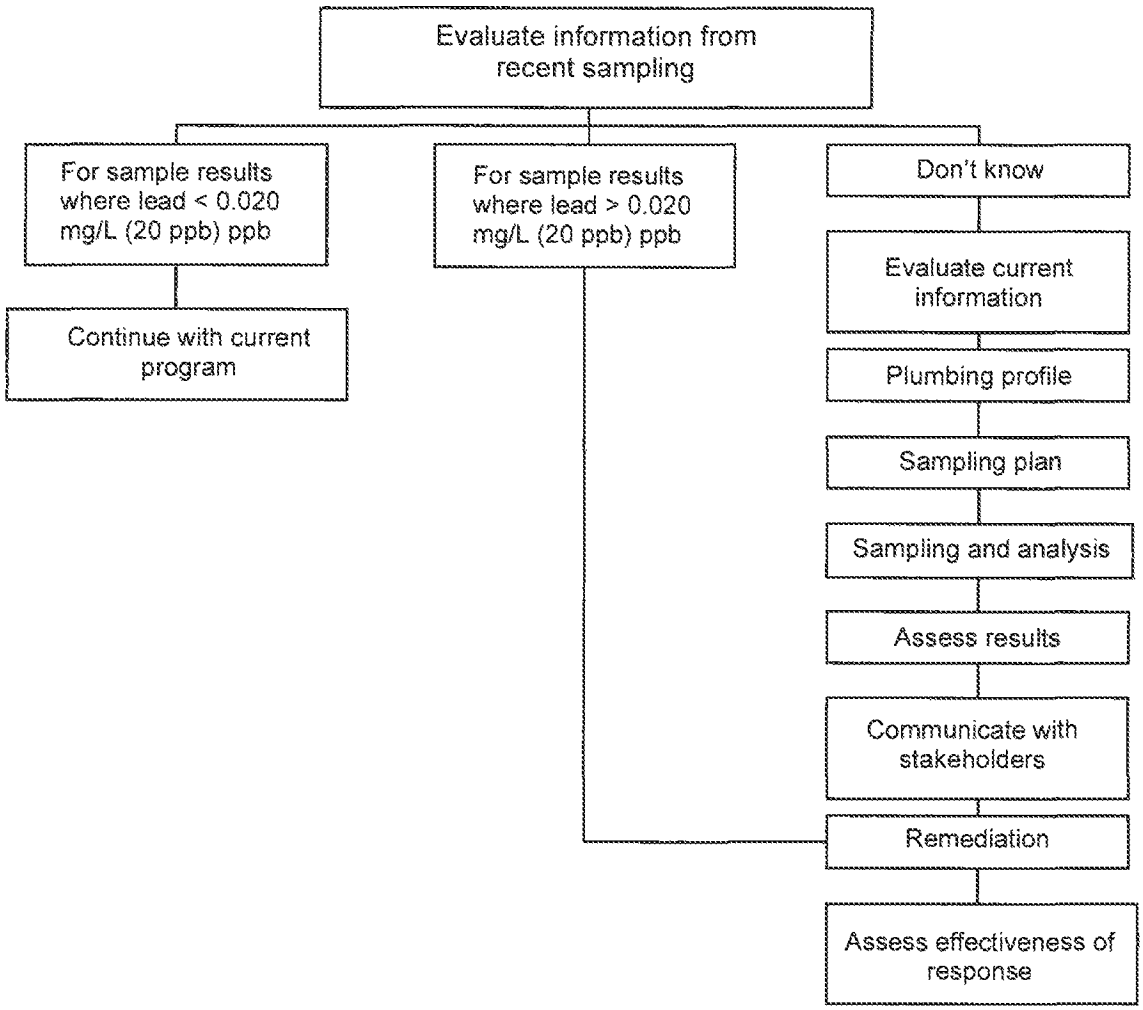
An Action Plan to address lead in drinking water must address both technical and communication concerns. Appendix D is an overview of the basic components of such a plan. This overview is supplemented with materials in the appendices (E – K) that water suppliers may provide to school and child care facility managers to inform and assist them in developing their Action Plans.

The components of the Action Plan should be structured to yield an assessment of the situation, a determination of the need for remedial action, development of a remediation strategy, execution of the remediation strategy, and finally, assessment of remediation strategy's effectiveness. More specifically, the plan should incorporate the following elements:

- Plumbing Profile
- Sampling Plan
- Interpretation of Analytical Results
- Action in Response to Findings
- Follow-up Sampling
- Communication

A process for school and child care facility administrators to undertake to evaluate lead levels in drinking water within their facilities is well described in EPA guidance *Lead in Drinking Water in School and Nonresidential Buildings* and *Sampling for Lead in Drinking Water in Nursery Schools and Day Care Facilities* and is summarized in Figure 1.

Figure 1
Managing Lead Levels in the Water Supply of Schools & Child Care Facilities





SUMMARY

Consumers and the media do not always understand how lead enters drinking water, and they are often confused about the water supplier's role in reducing exposure at the tap. However, since lead in drinking water is a water quality issue, the water supplier will often be sought out as the most knowledgeable voice in the ongoing public discussion. Utilities are providing their communities an important service when they proactively communicate potential risks, help the community understand relevant issues, and provide available assistance to school and child care administrators. In providing this service utilities help to ensure that well-reasoned measures are taken to protect public health.

APPENDIX A. RULES AND GUIDANCE ON LEAD IN DRINKING WATER

Lead Contamination Control Act

- This Act resulted in a recall of drinking water coolers with lead-lined tanks and a prohibition on the sale and manufacturing of any drinking water cooler that was not lead-free.
- Defines a "lead free water cooler" as "a drinking water cooler, that each part or component of the cooler which may come in contact with drinking water contains not more than 8 percent lead, except that no drinking water cooler which contains any solder, flux, or storage tank interior surface may contain more than 0.2 percent lead."
- Provides guidance to educational agencies and schools on sampling and testing protocols.
- Sets minimum requirements for notifying the public about lead observations in schools and childcare facilities.
- Requires water samples to be analyzed by a laboratory approved by the state.
- Additional information regarding Lead Contamination Control Act implementation is available through the Internet (http://www.epa.gov/safewater/lcrmr/pdfs/report_lcmr_schoolssummary.pdf)

Lead and Copper Rule

- This regulation applies to waters systems, including schools and child care facilities that provide their own water supplies.
- The Lead and Copper Rule provides a framework for utilities to a) determine if their corrosion control program is effective at limiting lead exposure; b) take additional steps to protect public health; c) and ensure consumers are notified if the utility finds lead above the Action Level in the community.
- The Lead and Copper Rule is based on a "treatment technique" requirement in which the lead Action Level is a trigger -- the Action Level is not health based.
- Monitoring under the LCR takes place at worst-case sampling locations. Samples are taken from water standing overnight in homes where lead pipe or lead solder is present.
- If more than 10% of tap water samples taken in LCR monitoring exceed the action level of 0.015 mg/L (15 ppb) water systems must take additional steps to reduce corrosivity (i.e., improve corrosion control, lead service line replacement).
- If more than 10% of tap water samples taken in LCR monitoring exceed the action level of 0.015 mg/L (15 ppb) water systems must notify area residents via newspapers, radio, TV and other means.
- Additional information regarding the Lead and Copper Rule is available through the Internet (http://www.epa.gov/safewater/lcrmr/lead_data.html)

Summary of Key Elements of the Lead Contamination Control Act

Organization	Responsibility
States and Local Governments	Provide for the dissemination of EPA's guidance document and testing protocol and the list of water coolers that are not lead-free Establish a program to assist local educational agencies in testing for and remedying lead contamination in drinking water from coolers and other sources of lead contamination at schools Make available lead testing results in the administrative offices of the local educational agency for inspection by the public, including teachers, other school personnel and parents Notify parents, teachers and employee organizations of the availability of lead testing results Repair, replace, permanently remove, or render inoperable water coolers that are not lead-free and that are located in schools, unless the coolers are tested and found to not contribute lead to drinking water
Environmental Protection Agency (EPA)	Publish a list of each brand and model of water cooler that is not lead-free, including a list of the brand and model of water coolers with a lead-lined tank and distribute the list to States Publish a guidance document and testing protocol to assist schools in determining the source and degree of lead contamination in school drinking water supplies and in remedying the contamination.
EPA and State Primacy Agencies	Publish and make available to the public, upon request, a list of laboratories certified by EPA or the State, to conduct analyses of lead in drinking water
Consumer Product Safety Commission	Issue an order requiring manufacturers and importers of water coolers with lead-lined tanks to repair, replace, or recall and provide a refund for such coolers
Water cooler manufacturers, importers, others	Do not sell any drinking water cooler, listed by EPA or any cooler that is not lead free*, including a lead-lined cooler.

* A lead free water cooler is defined as "a drinking water cooler, that each part or component of the cooler which may come in contact with drinking water contains not more than 8 percent lead, except that no drinking water cooler which contains any solder, flux, or storage tank interior surface may contain more than 0.2 percent lead."

Cooler Information

The LCCA, an amendment to the Safe Drinking Water Act, was signed into law on October 31, 1988. The potential for water supply coolers to supply lead to drinking water in schools and day care facilities was a principal focus of the legislation. The LCCA mandated the Consumer Product Safety Commission (CPSC) to order the repair, replacement or recall and refund of drinking water coolers with lead-lined water tanks. In addition, the LCCA called for a ban on the manufacture or sale in interstate commerce of drinking water coolers that are not lead-free. Civil and criminal penalties were established for violations of this ban. A consent agreement calls on cooler manufacturer Halsey-Taylor to provide a replacement or refund program that addresses all the coolers listed as well as "all tank-type models of drinking water coolers manufactured by Halsey-Taylor". Halsey-Taylor agreed to notify the public of replacement and refund program for all tank type models. Contact: Halsey-Taylor, 2222 Camden Court, Oak Brook, IL 60523, (630) 574-3503.

Water Coolers With Other Lead Components

EBCO Manufacturing

All pressure bubbler water coolers with shipping dates from 1962 through 1977 have a bubbler valve containing lead. The units contain a single, 50-50 tin-lead solder joint on the bubbler valve. Model numbers for the coolers in this category are not available.

The following models of pressure bubbler coolers produced from 1978 through 1981 contain one 50-50 tin-lead solder joint each:

CP3	DP15W	DPM8	7P	13P	DPM8H	DP15M	DP3R
DP8A	DP16M	DP5S	C10E	PX-10	DP7S	DP13SM	DP7M
CP5	WTC10	CP5M	CP10	13PL	DP7MH	DP7WD	DP13M-60
EP5F	DP5F	DP14M	DP20	SP12N	CP10-50	DP15MW	DP3R
DP14S	DP5M	EP10F	DP13A	DP13M	DP20-50	DP13A-50	DP14A-0/60
DP10F	CP3H	DP13S	CP3-50	DP7SM	DP8AH	DP10X	DP3RH
CP3M	DP7WM						

Halsey-Taylor

Lead solder was used in these models of water coolers manufactured between 1978 and the last week of 1987:

WMA-1	SCWT/SCWT-A	SWA-1	DC/DHC-1
S3/5/10D	BFC-4F/7F/4FS/7FS	S300/500/100D	

The following coolers manufactured for Haws Drinking Faucet Company (Haws) by Halsey-Taylor from November 1984 through December 18, 1987, are not lead-free because they contain 2 tin-lead solder joints. The model numbers:

HC8WT	HC14F	HC6W	HWC7D	HC8WTH
HC14FH	HC8W	HC2F	HC14WT	HC14FL
HC14W	HC2FH	HC14WTH	HC8FL	HC4F
HC5F	HC14WL	HCBF7D	HC4FH	HC10F
HC16WT	HCBF7HO	HC8FH	HC4W	HC8FH
HC4W	HWC7			

Halsey-Taylor Water Coolers with Lead-Lined Tanks

The following six models have one or more units in the model series with lead-lined tanks:

WM8A	WT8A	GC10ACR	GC10A	CG5A	RWM13A

The following models and serial numbers contain lead-lined tanks:

WM14A Serial No. 843034	WM14A Serial No. 843006
WT11a Serial No. 222650	WT21A Serial No. 64309550
WT21A Serial No. 64309542	LL14A Serial No. 64346908

APPENDIX B. SAMPLE UTILITY LETTER TO SCHOOLS AND CHILD CARE FACILITIES

[Date]

[Superintendent of Schools]
[Address]

Dear [Superintendent]:

Exposure to lead poses a serious health risk to children, particularly those 5 years of age and younger. While the majority of children's lead exposure comes from sources such as soil contamination, dust, or paint chips, lead in drinking water can be a contributing factor to overall lead exposure.

Lead is not a common contaminant in drinking water when it is distributed from the water treatment plant to customers. However, lead may enter water after coming into prolonged contact with a building's pipes and plumbing fixtures.]

As you may know, there are 3 major regulations that speak to minimizing lead in drinking water.

- The Lead and Copper Rule requires water utilities to control the corrosivity of its water.
- The Lead Contaminant Control Act (LCCA) addresses lead-free components in water coolers and provides guidance for schools and child care centers on sampling, analytical protocols, and public availability of the information.
- The Safe Drinking Water Act addresses the maximum lead content and leaching potential of plumbing material and fixtures.

We have included a summary of the results from our Lead and Copper Rule sampling over the past few years. Similar information is included in our annual Consumer Confidence Report mailed to all residences in the May/June timeframe each year.

We have attached the EPA brochure "Is there Lead in the Drinking Water?" which is part of the agency's Lead-Free Drinking Water in Schools Program. It gives an overview of the issue with website links and phone numbers for additional information.

We hope you find this information helpful. If you would like to discuss this further, or have any questions, please call [Name of water utility representative] at [Water utility representative's telephone number].

Sincerely,

[Water Utility Manager]

cc: [Local public health officials]

Enclosures

APPENDIX C. IDENTIFICATION OF SCHOOLS AND CHILD CARE FACILITIES

Listed below are resources that can assist utilities in identifying the schools and child care facilities within their service area.

- The Local Board of Education
- The state licensing office – a particularly useful resource in identifying child care facilities
- Child care information services as provided by the local government
- Child welfare advocacy groups
- The local health department
- Fire and police departments
- The water utility's billing system database
- The water utility's cross-connection control database
- The local telephone book/yellow pages (and equivalent web-based phone books)

APPENDIX D. SUMMARY OF STEPS IN A FACILITY ACTION PLAN

Develop a Plumbing Profile

A plumbing profile can help to determine if lead is likely to be a problem in the facility. It will also assist in prioritizing the sampling locations that are believed to pose the greatest risk. In the context of developing a plumbing profile, school and child care administrators should ensure that water coolers recalled under the LCCA are repaired or removed. In addition, they should understand the community's water and know what steps are already being taken to reduce the potential for lead to enter drinking water. A sample plumbing profile is provided in Appendix E.

Plumbing Profile

By identifying what materials are used in facility plumbing, it is possible to determine if monitoring is needed and if so where it would be most effective.

Develop a Sampling Plan and Sampling Protocol

A sampling plan is essential to obtaining high-quality data that characterize the levels of lead found in the school or child care facility's water supply. These data will form the basis on which to make remediation decisions. It is important for all involved to emphasize that the success of the Action Plan hinges upon a good sampling plan. The sampling plan should incorporate the following components:

Systematic identification and labeling of sampling points in the facility does not have to be elaborate, but it is essential to a sampling program.

- A prioritized list of sampling points to be included in the sampling effort, drawing on the results of the plumbing profile. Of highest priority should be those faucets/taps where water is either consumed or used for food preparation.
- A **written** sampling protocol that answers the following questions:
  - What should be the volume of the "first-draw" samples? The EPA Guidance Manual recommends a 250 mL sample.
  - How long is the period of stagnation prior to sample collection? In most instances, this ranges from 8 to 18 hours, with absolutely no water use during that period if possible.
  - How will location codes be assigned to each sampling point? Each sampling point should be labeled with a location code.
  - Which certified laboratory will perform the lead analysis?
  - How will samples be shipped to the laboratory?
  - What detailed record keeping form will be used? The form should include at a minimum: type of sample (i.e., first flush); date of sample collection; time of sample collection; name of sampler; sample location code; the manufacturer of the tap / outlet (bubbler, cooler, faucet, etc.); the model number of the tap / outlet; the name of the building from which the sample was collected. An example recordkeeping form is provided in Appendix H.

Data Management

For an assessment of monitoring results to be meaningful, a sound data management system must be established in the Action Plan and followed diligently during monitoring and reporting. Data management should be appropriate to the scale of the monitoring effort (i.e., managing data for a single structure need not be as elaborate as a data system for an entire school system). If lead contamination is found, sample records and test results will assist in pinpointing the sources of the problem and indicate possible remediation measures.

Assessing the Results

The analytical results should be evaluated with an established benchmark level[3] or point of reference. The LCCA guidance suggests 0.020 mg/L, but some states have chosen other levels. Sampling points with lead levels that exceed the benchmark should be considered candidate sites for either re-sampling (in order to confirm the results), removal from service, or remediation.

Action in Response to Findings - Develop a Solution

The analytical results may reveal situations that require further investigation. For example, if a child care facility exhibits elevated levels of lead, a thorough investigation of plumbing materials in that facility may be warranted. Preparation for investigative efforts should be planned in advance of the initial sampling program, so that a thorough investigation can be completed in a timely manner. Preparations should include but need not be limited to:

1. Identifying how investigation efforts will be prioritized and resources allocated.
2. Preparing staff or contractors to evaluate coolers, fixtures and other factors that might contribute to lead levels at a sampling location.
3. Identifying staff and setting protocols for running water through the outlet and re-sampling.
4. Preparing communication materials to convey results and education materials to parents, students, and staff.
5. Determining what alternative sources of drinking water to provide until remediation is complete.

Lead in drinking water can be a complex problem, and there is no single approach that is suitable for addressing all situations, rather solutions are very site-specific. Decisions will need to be based on the age and condition of a facility's plumbing, the nature of the water supply, testing results and sources of lead contamination. A common immediate action is to immediately remove from service any tap / outlet where elevated lead levels are observed until appropriate remediation measures are identified and instituted. When a tap / outlet is taken out of service, appropriate signage should be displayed until it is remediated.

When lead risks are identified, facility managers must find short- and long-term solutions. Short-term control measures may include:

- Cleaning debris from faucet screens,
- Measures to reduce galvanic corrosion (e.g., dielectric unions, paint or polymer coatings, etc.)
- Maintenance programs to assure adequate turnover of water in the facility's pipes,
- Removing outlets from use, and
- Providing bottled water.

More permanent fixes may include:

- Replacing taps, bubblers, coolers, faucets, or other outlets,
- Correcting improper grounding of electric wiring,
- Installing point-of-use devices,
- Installing corrosion control devices, and

[3] Like the LCR the LCCA guidance refers to this benchmark level as an "action level."

- Removing lead service lines.

Appendix I contains a detailed list of potential control measures and remedies that water suppliers may want to discuss with school and child care administrators.

Follow-Up Samples and Follow-Through

Upon undertaking steps to control lead levels in schools and child care facilities, it is important to test for lead levels to make sure that remediation has been effective. Follow-up sampling should be appropriately timed to allow for passivation to occur. Sampling conducted immediately following remedial measures may result in unrepresentative lead levels.

As noted previously, ongoing monitoring over time is important to ensure that control measures remain effective and that facility operators retain focus on managing lead levels. Maintaining an ongoing awareness of lead in water within the facility management program can facilitate continued reduction of lead levels over time and avoid the recurrence of conditions that might contribute to elevated lead levels. Appendix J includes a maintenance log sheet that can be used for ongoing management of lead in facility plumbing. Also, periodic re-sampling for lead levels in facilities on at least a screening study basis is appropriate to maintain control of lead management.

Communicating on Lead in Schools and Child Care Facilities

Because school and child care administrators are responsible for limiting lead exposure at the tap, they are typically the appropriate entities to communicate on lead in drinking water at their facilities. However, water suppliers are likely to have a role as well. In many cases, parents and the media will look to the drinking water supplier for information about:

- How lead gets into the drinking water supply at the tap,
- What steps are being taken by the water supplier to control lead in drinking water, and
- What consumers can do to reduce their own and their children's lead intake.

Water utilities that make this information available before a problem exists are likely to have more credibility in the eyes of the public in the event of a lead contamination event. Web-based fact sheets, consumer confidence reports, media backgrounders and brochures provide consumers with valuable information to protect their health. They are also valuable tools in a water supplier's overall risk communications strategy. AWWA also has materials available to utilities for this purpose (see Appendix L for example materials). Developing a collaborative communications program on lead in schools with the local health department, schools and child care facility administrators can be of assistance to all parties.

Water suppliers can provide significant support to school and child care administrators as they communicate with consumers through public meetings or with media through news conferences or briefings. Communications are more likely to be clear and consistent when they come from a unified source.

Important Elements in a Communications Strategy

Lead in drinking water can be an emotionally charged issue. An effective communications strategy is critical to explain potential risks, describe technical solutions and build trust among parents, school and child care officials, local health department officials, and water suppliers. Utilities that choose a cooperative, hands-on approach to public communications are better positioned to effectively communicate on this issue with their communities.

Public health agencies and drinking water suppliers can provide information that builds a technical foundation for school communications. For example, state and local public health agencies are responsible for ensuring compliance with the LCR and assisting facility managers in

implementing the LCCA and associated guidance. The local or state health agency possesses expertise and credibility in the area of risk management. Water suppliers deliver non-corrosive water to control lead leaching and have a detailed understanding of delivered water quality. Regardless of the level of participation by the water supplier, a communications strategy on lead in school drinking water should incorporate:

- Defined goals or objectives for the communications efforts.
- Identification of primary and secondary target audiences, including school management, staff, parents and wider school community; local policy makers; advocacy organizations, and media.
- Risk communication to concerned stakeholders.
- Clearly defined messages to be repeated in communications.
- Identification of available communications tools, including, but not limited to, web sites, school newsletters, letters to parents, public meetings, press releases and news conferences.
- Identification of potential language barriers.
- A timeline for key public communications moments, including just before a sampling program begins, after results of testing are obtained, and when solutions are made public.
- Information to media that defines relevant issues and communicates the control strategy.

Engaging Partners in the Action Plan

Water suppliers are one in a wide range of partners who may be available to assist school and child care administrators in their lead control strategies. Local health departments and state primacy agencies are key partners both for the water supplier and school and child care facilities. Whether lead in schools is addressed in a proactive or a reactive mode, most successful case studies suggest that the school or child care leadership benefit from expert third-party voices. The level of involvement among these partners varies, but they may include:

- Local building and plumbing inspection staff
- Teachers organizations
- Parental organizations
- Active community organizations
- Local government (i.e., city, county, town)

In some situations, school and child care facilities may benefit from consultant support. Examples might include assistance from laboratory services, engineering firms and communication experts.

In some school or child care settings the facility administrator may organize a stakeholder committee process. In some instances, the local drinking water utility will participate as a technical resource. The choice and scale of such an effort will reflect the local situation and the size of the school.

APPENDIX E. SAMPLE FACILITY PLUMBING PROFILE

When a detailed facility plumbing profile is needed, answering the following questions can provide useful insights into whether lead is present in a facility's plumbing, and if so, in what portions of the plumbing.

- When was the facility built?
- Have new buildings or additions been added? If so, when were they added? If built since 1986, was lead-free plumbing and solder used?
- When were the most recent plumbing repairs made and where were they located?
- From what material is the service line made?
- From what materials are the facility's potable water pipes made and what is their location? What materials were used to solder the potable water pipes in the system?
- Are brass fittings, faucets or valves used in the facility? Note locations.
- How many bubblers, icemakers, water coolers and kitchen taps are located in the facility? Where are they located?
- What brands and models of water coolers are in the facility? Where is their location?
- Do the faucets have accessible screens, and have they been cleaned?
- Can any signs of corrosion, such as leaks, rust-colored water or stains be detected?
- Is any electrical equipment grounded to water pipes?
- What do the records of previous water testing show?

It may be advisable to consult with a local plumbing expert as you answer these questions.

APPENDIX F. UNDERSTANDING THE SIGNIFICANCE OF PLUMBING PROFILE

When was the facility constructed? Plumbing before 1930 is most likely to contain lead. Between 1920 and 1950, galvanized pipes were used for plumbing. After 1930, copper generally replaced lead. Up until the late 1980s, lead solders were typically used to join copper pipes. The lead-free requirements of the 1986 Safe Drinking Water Act banned lead solder with more than 0.2% lead and plumbing with more than 8% lead. Buildings did not have to be built with certified "lead-free" fixtures until 1997.

Are there new buildings and additions? New buildings are unlikely to have lead pipes, but they are likely to have copper pipes with solder joints. Buildings built prior to 1986 are likely to have joints made of lead solder. Some brass fittings, although they contain less than 8% lead in alloy, may still contribute a significant amount of lead to drinking water.

When were plumbing repairs made? Corrosion is a result of the chemical reaction between water and pipes. Known as galvanic reaction, this can be vigorous in new piping until a protective layer is built up. After about five years, the reaction usually slows down, and lead enters the water as a result of more typical corrosion. If water supplied to a facility is corrosive, lead can remain a problem regardless of the age of the plumbing.

What material is used in the service line? Historically lead piping was used in some communities for service lines that join buildings to public water supplies. Lead pipes are dull gray in color and may be easily scratched by a metal object. Lead pipes can be a major source of lead contamination. Galvanized pipes are gray and usually fitted together with threaded joints. Copper pipes are red-brown in color. Corroded portions may show green deposits. Plastic pipes should meet NSF International Standards for drinking water.

Are brass fittings, faucets or valves used in your facility? Brass is composed of two metals, commonly copper and zinc. Brass fittings used in drinking water taps / outlets often contain up to 8% lead. This is considered "lead-free" under the Safe Drinking Water Act. Contamination may still take place. The amount of lead that will leach from brass products with less than 8% lead is dependent upon the corrosiveness of the water and the processes employed in manufacturing the products. New brass may leach higher levels of lead until it passivates.

Type of taps / outlets used for drinking water? Components of the system, lead solders and lead in brass may all be sources of lead.

What are the brands and models of water coolers? Water coolers may be a major source of lead contamination. Under the Lead Contamination Control Act of 1988, water coolers with lead-lined tanks are considered to be imminently hazardous consumer products, and manufacturers and importers are to repair, replace or recall these coolers. Limits for solder, flux, and storage tank interior surfaces in contact with drinking water may not contain more than 0.2% lead. Other parts of water coolers that may come in contact with drinking water are not to contain more than 8% lead. The law attaches criminal and civil penalties for the manufacture and sale of water coolers containing lead.

Do faucets have accessible screens and when were they cleaned? Lead-containing sediments that are trapped on screens can be a source of significant contamination. Sediments may need to be tested, and screens should be cleaned frequently.

Are there signs of corrosion? Corrosion may indicate high levels of lead, copper and iron in the water.

Is electrical equipment grounded to water pipes? Electric current traveling through the ground wires may accelerate the corrosion of interior plumbing containing lead. DO NOT remove the wires from the pipes unless a qualified electrician installs an alternative grounding system. Improper grounding of electrical equipment may cause severe shock.

When was the water in your facility tested for contaminants? Results of water quality testing can provide clues about the corrosiveness of the water. If your facility operates its own water supply, such tests can help you decide on effective treatment approaches.

APPENDIX G. EXAMPLE SAMPLING PROTOCOL

Presented below are the general procedures for collecting samples of water for lead testing. Some environmental service providers and environmental laboratories will provide on-site sampling. Sampling by school or child care personnel is also an option. All personnel who assist in sampling should be adequately trained in proper sampling procedure, including site-specific record-keeping requirements. The following is a generic sample collection protocol.

Sample Containers

Obtain sample containers from the laboratory that will be performing the lead analysis.

> **Caution**
>
> Only use containers from a certified laboratory.

Sample Collection

Be certain to carefully follow the instructions provided by the laboratory.

1. Collect all water samples before the facility opens for the day and any water usage occurs.

> **Caution**
>
> Do not rinse the sample containers before filling.

2. The water must have sat in the pipes for at least 8 hours and not more than 18 hours before a sample is taken.

3. Do not collect samples after vacations, weekends or holidays.

4. Collect a 250-milliliter sample in the container provided by the laboratory from each outlet of interest without wasting any water before sampling the outlets.

5. Assign a unique sample identification number to each sample. Record that number on the recordkeeping form.

6. Accurately complete the recordkeeping form immediately following the collection of each sample. **Accurate information about the sample is essential.**

7. Ship the sample as instructed.

APPENDIX H. EXAMPLE RECORDKEEPING FORM

Name of Building	
Name of Sample Collector	
Contact Person for this Record	

				Sample ID Number

(circle sample type) Service Connection Initial 1st Follow –up 2nd Follow-up

Duration of Flush (e.g., first flush, 30 seconds, etc.)	
Type of Tap / Outlet	
Mfg/Model	
Serial #	
Date of Installation	/ /
Tap Location (and code)	
Date of Collection	/ /
Time of Collection	am pm
Name of Laboratory Used	
Lead Concentration (mg/L)	

NOTES:

APPENDIX I. RESPONSE ACTIONS TO BE USED AFTER HIGH LEAD LEVELS ARE FOUND

Control Measures

Clean debris from all accessible screens frequently. If sediment is found in faucet screens, have the sediment tested by a laboratory and continue to clean screens frequently.

Use only cold water for food and beverage preparations in cafeterias and cooking classes. Hot water will dissolve lead more quickly than cold water and is therefore more likely to contain increased lead levels.

Turn off water to the tap / outlet using available valves or by capping the water line to taps / outlets where elevated levels of lead are identified. When taking this approach, the facility must continue to meet applicable codes for availability / accessibility of drinking water within the facility.

EPA guidance, Lead in Drinking Water in Schools and Non-Residential Buildings, provides specific recommendations for assuring adequate turn over of water in facility plumbing (see pages 31 and 32 of the guidance document). The following is a brief summary of that guidance.

- Flush the piping system in the facility.

  First-flush water that has been in contact with the facility plumbing for more than six hours should not be consumed. Flushing involves opening all suspect taps / outlets every morning before the facility opens and letting the water run for a period of time to clear water standing in the interior pipes and taps / outlets.

  Locate the tap / outlet farthest from the service line on each wing and floor; open the tap / outlet wide and let the water run for 10 minutes. For precise results, calculate the volume of the plumbing and flow rate -- exact determinations likely require assistance from a plumber or engineer.

  Open all valves at all drinking water fountains without refrigeration units and let the water run for one minute.

  Let the water run on refrigerated water fountains for 15 minutes. Because of the long time period required, routine flushing of these units may not be practical. Replacing them with lead-free units may be necessary.

  Open all kitchen taps / outlets (and any other taps /outlets used for drinking and/or cooking purposes) and let water run for one minute.

- Consider providing bottled water. This can be an expensive alternative. If this is the selected option, obtain a written statement from the bottled water distributor guaranteeing that the bottled water meets FDA and state standards.

  If provided, procedures on the use and care of dispensers/bottles must be developed and implemented. A very good source of information on this topic (and other topics related to lead in schools) can be found on the website of the Massachusetts Department of Environmental Protection at: http://www.mass.gov/dep/brp/dws/ lead.htm. Taking steps

such as using disposable bottles or refillable bottles that have been properly cleaned are essential to assuring a safe water supply.

Long-Term Remedies

There are a number of long-term actions that might reduce or eliminate sources of lead contamination that originate in a facility's plumbing. The results of testing will provide information that will help determine which treatment options will be most appropriate for individual circumstances.

While flushing individual or all taps / outlets may be a long-term solution, it does involve a potential for wasting water, which is particularly of concern in communities that are seeking to encourage conservation. While it is a quick and easy method, with nothing to install, flushing can be time-consuming for staff. There is also a risk of forgetting that the water is flowing. This process would also require that someone be responsible for follow-up to ensure that procedures are properly followed and are effectively reducing lead levels.

Time-operated solenoid valves can be installed to automatically flush the main pipes. However, these solenoids are not practical for flushing water coolers. Water coolers can be flushed continuously, using a needle valve, a drain and an air gap or flushed manually.

If the source of lead contamination is localized or limited to a few taps / outlets, replacing the taps / outlets might be the most practical solution. A tap / outlet may be replaced with a new one if the existing tap / outlet is suspected to be the contamination source. Metallic fixtures, even new ones, may contain up 8% lead and still be recognized as "lead-free". If you choose a solution that requires work by a plumber on any part of the facility's plumbing system, make sure the plumber uses only "lead-free" solders and materials. The SDWA of 1986 requires only "lead-free" materials be used in new plumbing and plumbing repairs.

Water that is soft or acidic can be treated to make it less corrosive. Corrosion control devices for individual buildings are commercially available. Installation of corrosion control treatment is generally not recommended because of the degree of operator skill and maintenance required. Further installation of treatment may redefine the facility as a "Public Water System," which makes it subject to SDWA regulations. Carbon, sand, cartridge filters and water softeners will not prevent corrosion.

Lead levels can be reduced at the tap / outlet. Reverse osmosis and distillation units are commercially available and can be effective at removing lead. These devices do make water corrosive and should be used only when placed at the tap / outlet. Facility managers should obtain information about these devices by writing or calling: National Sanitation Foundation International (NSF), 789 Dixboro Road, P.O. Box 130140, Ann Arbor, MI 48113-0140, (800) 673-6275.The device should be approved as meeting NSF Standard 53, NSF Standard 58 or the equivalent. It must be installed, operated, and maintained in accordance with manufacturer's recommended procedures. Proper operation and maintenance is essential.

Develop an alternative grounding scheme for electrical wires attached to internal plumbing systems to avoid acceleration of corrosion by electrical currents.

APPENDIX J. EXAMPLE MAINTENANCE CHECKLISTS

Maintenance Checklist

Name of Facility: _____

Address: _____

_____

Contact Name: _____

Phone #: (_____) _____

ACTIVITY TO BE EVALUATED	Yes	NO	Action
Plumbing Related to Drinking Water Fixtures			
Plumbing survey has been conducted?			
Alterations made to existing plumbing system?			
Certified components/materials used?			
Licensed plumber for the installation/modifications/alterations?			
Drinking/cooking outlets flushed at the start of each school day?			
Drinking Fountains			
Drinking fountains checked for known lead-containing models?			
Drinking fountains on the list of known lead-containing models removed?			
Collection/testing of water samples for lead has been implemented?			
Remedial actions implemented for fountains exceeding the action limit?			
Fountains exceeding the action limit after remedial actions removed?			
Cafeteria (if applicable)and Cooking Classes (if applicable)			
Faucets included in a regularly scheduled sampling/testing program?			
Only cold water is used for preparing foods and beverages?			
Bottled Water (if used) Water (if used)			
Bottled water is a substitute for devices taken out of service?			
Bottled water supplier approved by Arizona Department of Health?			
Bottled water stored in a safe, secure area?			
Dispensers cleaned regularly?			
Record Keeping			
Drinking Water Testing/Quality Records in a centralized and clearly labeled file?			

Evaluation of Results: (check all that apply)

☐ School in compliance

☐ Additional testing needed (Start Date: __/__/__)

☐ Flushing proposed (Start Date: __/__/__)

☐ Treatment units planned (Start Date: __/__/__)

☐ Bottled water proposed (Start Date: __/__/__)

☐ Educational notice for parents and school proposed (Start Date: __/__/__)

☐ Other actions planned _____(Start Date: __/__/__)

Source: Arizona Department of Health. A Manual for Assessing Lead In Drinking Water in Arizona Schools and Day Care Facilities, October 2004.

Manual Flushing Log
Lead And Copper Remediation

Name of School: _____

Address of School: _____

Location of Flushing Device Within School: _____

Month: _____

Day	Duration of Flush		Operator's Name (Please Print)	Operator's Signature
	Start Time	End Time		
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				

Name of Operator/ or Authorized Personnel Conducting Flushing:

_____ _____

Print Name Sign Name

NOTE: Use one log per flushing location. It is the responsibility of the school's principal to ensure that this log and /or a copy of it is kept on file at all times.

Source: Massachusetts Department of Environmental Protection. Lead in Schools, April 2004.

APPENDIX K. EPA BROCHURE "IS THERE LEAD IN THE DRINKING WATER?"

How does lead get into water?

Lead enters the water ("leaches") through contact with the plumbing.

Lead leaches into water through:

- Corrosion of
  - Pipes
  - Solder
  - Fixtures and Faucets (brass)
  - Fittings
- Particles caught in aerators

Water characteristics, such as pH, hardness and temperature, affect the amount of leaching.

Why should we test the water?

Lead is a health risk to infants and children.

Exposure to lead is a significant health concern, especially for pregnant women, young children and infants, whose growing bodies tend to absorb more lead than the average adult. Drinking water is one possible exposure route for lead. A dose of lead can have a big effect on a little body, especially an infant whose diet is mostly liquid.

The longer water remains in contact with leaded plumbing, the more opportunity exists for lead to leach into the water. Facilities with prolonged periods of no water usage, such as schools and day cares, may have elevated lead concentrations in the water.

Many children spend a significant part of their days at school or in a child care facility. The fixtures that provide water for consumption, including drinking, cooking lunch, and preparing juice and infant formula, should be tested.

Testing is the only way to confirm if lead is present or absent.
Lead solder with more than 0.2% lead and plumbing with more than 8% lead were banned in 1987. Buildings did not have to be built with certified "lead-free" fixtures until 1997. Even new, certified components can leach some lead.

Water System tests do not give the whole picture.

Most water systems test for lead as a regular part of water monitoring. These tests give a system-wide picture but do not reflect conditions at a specific drinking water outlet.

How do we participate in the lead-free drinking water program?

- Develop a sampling plan.
- Take water samples.
- Use a certified lab to analyze water samples.
- Replace outlets with lead-free components, as necessary.

EPA's guidance, "Lead in Drinking Water in School and Nonresidential Buildings" and "Sampling for Lead in Drinking Water in Nursery Schools and Day Care Facilities," can help schools and day cares achieve lead-free drinking water. Obtain these documents through www.epa.gov/safewater/Pbhs

See this site for more tools to help achieve lead-free drinking water: www.epa.gov/safewater/lead/schools/index.html

Hotlines and Information

National Lead Information Center:
800-424-LEAD
EPA Safe Drinking Water Hotline:
800-426-4791
Drinking Water Information:
www.epa.gov/safewater/lead
Plumbing Standards:
www.nsf.org

What can I do to reduce lead risk at my home?

- After the water is stagnant for several hours, flush pipes until you feel the temperature change before cooking, drinking, or brushing teeth.
- Use only cold water for cooking and drinking. Never cook or mix infant formula using hot water.
- Have your water tested.

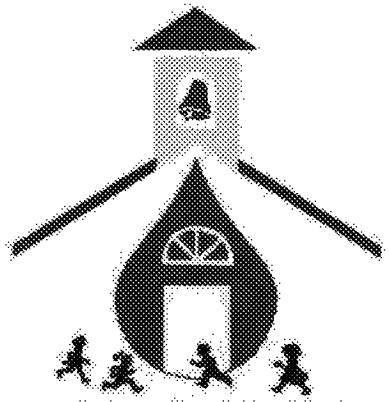
EPA Region III
Water Protection Division
EPA 903-F-02-002
April 2002

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EPA

Is there lead in the drinking water?

You can reduce the risk of lead exposure from drinking water in educational facilities.



Lead-Free Drinking Water
In Schools and Day Cares

APPENDIX L. QUESTIONS AND ANSWERS – LEAD IN DRINKING WATER

Q: How does lead get into water?

A: Lead generally enters drinking water after contact with a building's plumbing system. Lead may be present in the components of the plumbing system such as lead solder, brass fixtures and lead pipes. The amount of time the water is in contact with the lead components of the plumbing system is typically the factor that contributes most significantly to the amount of lead in the water supply.

Q: Why should we test the water?

A: The only way to determine how much lead is present in the drinking water in your facility is to have the water tested for lead.

Q: Why is lead a health concern?

A: Lead is a toxic material that is known to be harmful to humans if ingested or inhaled. Lead can cause damage to the brain, kidneys, nervous system and red blood cells. Children, infants, pregnant women and their unborn children are especially vulnerable to the harmful effects of lead. Lead has been associated with impaired mental and physical development in children.

Q: How are children exposed to lead?

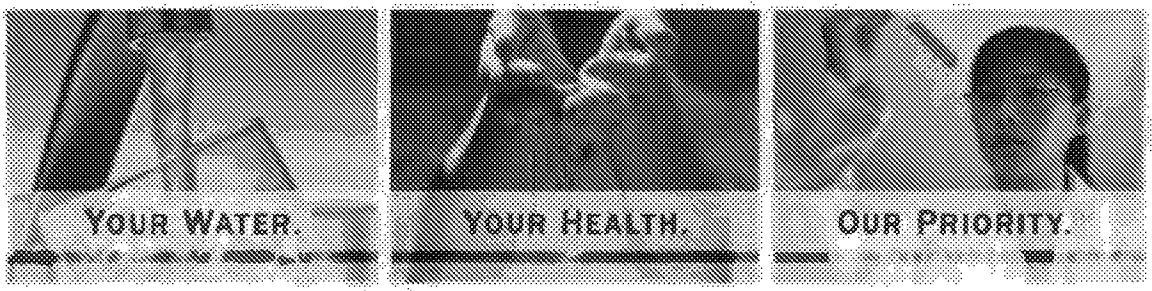
A: Children can be exposed to lead from a number of sources, including lead-based paints in housing built prior to 1978, lead-contaminated dust and soil and drinking water. Drinking water typically is not the primary source of exposure to lead for children.

Q: Why is lead a special concern for schools and child care facilities?

A: Children are more vulnerable to the effects of lead exposure. Growing children will also absorb the lead that they consume more rapidly than adults. In addition, children at play may come into contact with more sources of lead, such as dirt and dust, than adults.

Q: At what level does the U.S. EPA recommend taking action on lead results from water in schools?

A: The U.S. EPA recommends taking action if lead levels in drinking water in schools at 20 parts per billion or greater.



STRAIGHT Talk Lead in Water

The U.S. Environmental Protection Agency (EPA) notes that "the greatest exposure to lead is swallowing or breathing in lead paint chips or dust." However, while lead is rarely present in water coming from a treatment plant, it can enter tap water through corrosion of some plumbing materials. Lead builds up in the body over many years and can cause damage to the brain, red blood cells and kidneys. The greatest risk is to young children, pregnant women and their unborn babies.

- Since 1992, all public drinking water systems are required to regularly test a sample of high-risk homes for lead at the tap.
- If the results from lead testing exceed the EPA "action level" of 15 parts per billion in more than 10 percent of homes tested, individual water utilities are required to notify area residents via newspapers, radio, TV and other means.
- In instances of high lead levels in water, the most common sources are lead-based solder used to join copper pipe, faucets made of brass and chrome-plated brass, and in some cases, pipes made of lead that connect a home to the water main.
- In 1986, Congress banned the use of solder containing more than 0.2% lead and restricted the lead content of faucets, pipes, and other plumbing materials.

Concerned residents can take several steps to limit possible exposure:

- You can't see, smell or taste lead in your water. Testing at the tap is the only way to measure the lead levels in your home or workplace. If you choose to have your tap water tested, be sure to use a properly certified laboratory. Testing usually costs between $20 and $100.
- Flushing your water tap clears water from your plumbing and home service line to ensure you are getting drinking water from the main, where lead is rarely present. Let the water run from the tap until it is noticeably colder (this may take two minutes or more) before using it for cooking or drinking. Flushing the tap is particularly important when the faucet has gone unused for more than a few hours.

(Continued)

American Water Works Association

6666 West Quincy Avenue
Denver, CO 80235-3098
www.awwa.org
303.794.7711

The Authoritative Resource on Safe Drinking Water

- Some home treatment devices remove lead, but not all do. Before you purchase a home treatment device, you should verify the manufacturer's claims. A good resource to assist you is NSF International — www.nsf.org. Once a treatment device is installed, make sure it is properly maintained.
- Use only cold water for cooking or drinking. Lead leaches more easily into hot water than cold water. Boiling water DOES NOT remove lead.
- Consult with your family doctor or pediatrician to receive a blood test for lead and learn more about the health effects associated with exposure.

American Water Works Association

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American Water Works Association

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www.awwa.org

The Authoritative Resource on Safe Water℠

Issue Backgrounder

Lead in Drinking Water

Where does lead come from?

- Lead is a naturally occurring metal that was used regularly in a number of industrial capacities for most of the 20th century. We no longer use lead in many of these products, but lead from older products remains.
- The U.S. Environmental Protection Agency (EPA) and the U.S. Centers for Disease Control (CDC) report that lead paint (and the contaminated dust and soil it generates) is the leading source of lead exposure in older housing. Lead has been used as a component of paint, piping (including water service lines), solder, brass, and until the 1980s, as a gasoline additive.

Why is lead a health concern?

- Lead builds up in the body over many years and can cause damage to the brain, red blood cells and kidneys.
- The greatest risk is to young children, pregnant women and their unborn babies. Amounts of lead that won't hurt adults can slow down normal mental and physical development of children, particularly those under 6 years old.
- At high levels of contamination, lead can damage adults' kidneys and reproductive systems. And at extremely high levels, lead poisoning can cause mental retardation, coma, convulsions and death.
- A child at play can come into contact with sources of lead contamination – such as dirt, dust and paint chips – that rarely affect an adult. It is important to wash children's hands and toys often, and to try to make sure they only put food in their mouths.
- For more information on lead contact the visit www.cdc.gov or contact Jennifer Sarginson of the CDC's Lead Poisoning Prevention Branch at (404) 498-0694.

Where does lead in drinking water come from?

- Lead contamination is rarely found in sources of water such as rivers, wells and reservoirs. It's almost never present in water leaving a treatment plant or traveling through water mains.
- EPA estimates that 10 to 20 percent of human lead exposure may come from drinking water, and infants who consume mostly mixed formula may receive 40 to 60 percent of their lead exposure from drinking water.
- The most common sources of lead in drinking water are lead-based solder used to join copper pipe, faucets made of brass and chrome-plated brass, and in some cases, pipes made of lead that connect a home to the water main (service lines).

- Lead enters drinking water as a result of corrosion, as water comes into contact with lead materials over a period of time. If standing water is in contact with lead materials for several hours, the water may accumulate lead levels that are of concern.
- Water providers adjust their treatment procedures to achieve "optimized corrosion control," which significantly reduces the amount of lead leaching into the water.

What is the Lead and Copper Rule?

- The Lead and Copper Rule provides a framework for utilities to a) determine if their corrosion control program is effective at limiting lead exposure; b) take additional steps to protect public health; c) and ensure consumers are notified if the utility finds lead above the action level in the community.
- The Lead and Copper Rule is based on a "treatment technique" requirement in which the lead action level is a trigger – the action level is not health based.
- Monitoring under the LCR takes place at worst-case sampling locations as samples are taken of water standing overnight in homes where lead pipe or lead solder is present.
- If the results from lead testing exceed the EPA "action level" of 15 parts per billion in more than 10 percent of homes tested, individual water utilities are required to notify area residents via newspapers, radio, TV and other means.
- EPA's most recent data confirms that the elevated lead levels in Washington, D.C., are not common nationwide. More than 96 percent of utilities reporting data do not exceed the 15-parts-per-billion action level for lead. (http://www.epa.gov/safewater/lcmr/lead_data.html)

How is the water community responding to issues of lead in drinking water?

- The drinking water community supports the thorough examination of the situation in Washington, D.C. and the Lead and Copper Rule, which EPA is now undertaking.
- The American Water Works Association has testified before U.S. Congressional committees about this subject. Testimony is available at: http://www.awwa.org/Advocacy/govtaff/legislat/leg_test.cfm
- EPA is hosting a series of workshops to further study all aspects of lead in drinking water, including recent sessions on public communication of lead issues and lead in schools.
- The American Water Works Association has convened working group of utility professionals examining the lead in drinking water issue and identifying best practices.

How can consumers protect themselves from lead in drinking water?

While water providers have taken steps to limit lead in drinking water, consumers can take the following steps if concerned about lead exposure:

- Find out about lead testing results in their community. Each utility's annual Consumer Confidence Report contains information on lead monitoring conducted under the Safe Drinking Water Act. If they do not have a Consumer Confidence Report, they can contact their utility for a copy.
- You can't see, smell or taste lead in your water. ***Testing at the tap is the only way to measure the lead levels in your home or workplace.*** If consumers choose to have their tap water tested, they should use a properly certified laboratory (they can call their utility to obtain a list). Testing usually costs between $20 and $100.

- Flushing the water tap is a simple method to help avoid high lead levels. Flushing clears water from the plumbing and home service line to ensure the drinking water comes from the main, where lead is rarely present. Let the water run from the tap until it is noticeably colder (this may take two minutes or longer) before using it for cooking or drinking. Flushing the tap is particularly important when the faucet has gone unused for more than a few hours, because the longer water resides in home plumbing, the more lead it may contain.
- Flushing the tap may not be effective in reducing lead levels in high-rise buildings. If those consumers are concerned about lead in their drinking water, they should talk to their landlord or consult their local health department about ways to minimize exposure.
- Use only cold water for cooking or drinking. Lead leaches more easily into hot water than cold water. Boiling water DOES NOT remove lead.
- A licensed plumber can determine if a home contains lead solder, lead pipes or pipe fittings that contain lead. A plumber can also determine if a home has a lead service line connecting home plumbing to the community water system's water main. The presence of these materials does not mean lead is in the water, but that the potential for lead in the water exists.
- Make sure that repairs to copper piping do not use lead solder.
- Some home treatment devices remove lead, but not all do. Before purchasing a home treatment device, consumers should verify the manufacturer's claims. A good resource is NSF International (www.nsf.org).
  Once a treatment device is installed, make sure it is properly maintained. Using bottled water is also an alternative. (Information on the lead levels in bottled water is available from bottled water manufacturers.)
- Consult with the family doctor or pediatrician to receive a blood test for lead and learn more about the health effects associated with exposure. CDC recommends all children be tested for lead.

Overview of Awwa Research Foundation (AwwaRF) Lead Research

The water community has been studying corrosion control and its impact on lead in drinking water for many years. Below is a list of studies from AwwaRF, a member-supported, international, nonprofit organization that sponsors research to enable water utilities, public health agencies, and other professionals to provide safe and affordable drinking water to consumers.

One of the most important lessons learned from the AwwaRF research conducted on lead and copper corrosion is that every utility's lead and copper corrosion challenges are unique to that utility's source water quality, treatment train, and distribution system configuration and materials. There is no standard "recipe" for lead and copper corrosion control that every utility can apply regarding treatment strategies, corrosion control strategies, or distribution system management.

Areas of AwwaRF Research:

Corrosion Control Effects on Water Quality and Corrosion

Distribution system Water Quality Changes Following Corrosion Control Strategies (2000)
A General Frame Work for Corrosion Control Based on Utility Experience (1997)
Role of Phosphate Inhibitors in Mitigating Lead and Copper Corrosion (2001)

Treatment Process Effects On Lead and Copper Corrosion
Chloramine Effects on Distribution Systems Materials (1993)
Optimizing Chloramine Treatment (Currently in publication)
Impacts of Enhanced Coagulation on Corrosion of Water Treatment Plant Infrastructure (2004)
Disinfectant Decay and Corrosion: Laboratory and Filed Studies (2004)

Specific Water Chemistry Effects on Lead and Copper Corrosion
Corrosion and Metal Release for Lead Containing Plumbing Materials (1999)

Tools to Help Utilities Manage Lead and Copper Corrosion Issues
Development of a Pipe Loop Protocol for Lead Control (1994)
Optimizing Corrosion Control in Water Distribution Systems (2004)
Post-Optimization Lead and Copper Monitoring Strategies (2004)
Lead Pipe Rehabilitation and Replacement Techniques (2000)
Lead Control Strategies (1990)

Contact AWWA Public Affairs for more information

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gkail@awwa.org | 303-734-3410
Kylah Hedding, Public Affairs Manager
khedding@awwa.org | 303-347-6140

APPENDIX M. SOURCES OF INFORMATION

There is a significant body of information on the topic of dealing with lead in the drinking water supply of schools and child care facilities. Following is a partial listing of useful reference materials and the website address at which the materials can be accessed.

Websites

Lead

American Water Works Association
http://www.awwa.org/

American Water Works Association Research Foundation
http://www.awwarf.org/research/TopicsAndProjects/Resources/SpecialReports/Corrosion/index.aspx

Centers for Disease Control
CDC Childhood Lead Poisoning Prevention Program
http://www.cdc.gov/nceh/lead/about/program.htm

CDC Childhood Lead Poisoning Surveillance
http://www.cdc.gov/nceh/lead/surv/surv.htm

National Child Care Association
http://www.nccanet.org/

National Rural Water Association
http://www.nrwa.org/

U.S. Environmental Protection Agency [4]
Lead in Drinking Water in School and Nonresidential Buildings –
http://www.epa.gov/safewater/Pubs

Sampling for Lead in Drinking Water in Nursery Schools and Day Care Facilities --
http://www.epa.gov/safewater/Pubs

Lead in Drinking Water –
http://www.epa.gov/safewater/lead/index.html

Lead in Schools and Child Care Centers [5]
http://www.epa.gov/safewater/lead/schoolanddccs.htm

Lead in Drinking Water Coolers
http://www.epa.gov/safewater/consumer/lead_app-a_86-95.pdf

Sampling for Lead in Drinking Water in Nursery Schools and Child Care Centers [6]

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[4] Website addresses change over time. In particular, U.S. EPA program effort will likely result in changes to website addresses later this year.
[5] U.S. EPA is currently revising this guidance manual. Revised guidance will be forthcoming in 2005 or 2006.
[6] Ibid.

http://www.epa.gov/safewater/lcmr/nursery.pdf

Guidance Manual - "*Lead in Drinking Water in Schools and Nonresidential Buildings*"[7]
http://www.epa.gov/safewater/consumer/leadinschools.html

Controlling Lead in Drinking Water for Schools and Child Care Centers: A Summary of State Programs -
http://www.epa.gov/safewater/lcmr/pdfs/report_lcmr_schoolssummary.pdf

Implementation of the Lead and Copper Rule
http://www.epa.gov/safewater/lcmr/implement.html

Individual State Programs (Examples)

Arizona Department of Environmental Quality
A Manual for Assessing Lead In Drinking Water in Arizona Schools and Day Care Facilities
http://www.azdeq.gov/download/lead.pdf

Massachusetts Department of Environmental Protection
Lead and Copper in Schools –
http://www.mass.gov/dep/brp/dws/lead.htm

Minnesota Department of Health
Reducing Lead in School Drinking Water
http://www.health.state.mn.us/divs/eh/water/schools/index.htm

Plumbing Standards

NSF International
http://www.nsf.org

Hotlines:

National Lead Information Center: 800-424-LEAD

EPA Safe Drinking Water Hotline: 800-426-4791

[7] Ibid.

MDEQ - Governor's Office Briefing - City of Flint Drinking Water (Draft)

What contributed to the Boil Water Advisories in the City of Flint?

A number of factors, not one specific cause, likely contributed to the Boil Water Advisories (BWA's) in the City of Flint during August and September 2014. While use of the Flint River has increased the amount of natural organic matter in the City's water, the City's water treatment plant (WTP) has performed well above treatment requirements for organic carbon removal. In addition, less than 20% of the water system was included in the advisory area. If treatment had been compromised, detections would have been widespread throughout the City, rather than in such a localized area.

The City's water distribution system has suffered from a lack of infrastructure investment and asset management. Most of the City's over 550 miles of water mains are now over 75 years old, and constructed of cast iron piping. Cast iron pipe is subject to internal corrosion, called tuberculation, which causes buildup on the pipe interior leading to water quality issues, reduced flow and pressures, and leakage. Tuberculation also encourages the development of biofilms, layers of bacteria that attach to the interior pipe wall. Biofilm growth is common in areas of piping with little or no disinfectant residual, and together with tuberculation can clog water lines to the point of insufficient water pressure.

The City has also experienced decades of a declining user base and water use associated with vacant homes, commercial businesses and industrial property. Declining water use leads to excess residence time within the City's distribution pipes and water storage facilities, accelerating tuberculation, biofilm growth, and disinfectant residual degradation. While the City has recently seen an infusion of funding for blight removal, contractors completing this work have been improperly using fire hydrants, causing hydraulic disturbances that dislodged and suspended settled debris, which may have contributed to the bacterial contamination.

The winter of 2014 was also one of the coldest experienced by the water system. The City, which historically has unaccounted water losses of over 30%, has seen even greater losses since February due to an increase in cold weather related water main breaks and leaks. The City lacks a formal maintenance program for its over 7,250 valves, which would normally be used to limit impacts during break repairs. Two valves on the transmission line used to supply the area of the BWA were found to be closed during the City's investigation, causing longer residence time, reduced disinfectant residual, reduced flow, and reduced pressure. One of these valves has remained broken.

The BWA's also occurred during the warmest and for 2014 relatively wet periods of August and September. Warm weather conditions are not only more conducive to bacterial growth but also degrade the water's disinfectant residual carried out from the WTP more quickly. Longer residence times, biofilms, and tuberculation also contribute to disinfectant residual degradation. Warm wet weather conditions also allow water contaminated with bacteria to pool around piping with leaks and breaks.

Process for Issuance and Cancelation of a Boil Water Advisory

There are a number of conditions that can trigger boil water advisories. This includes the following:

- Bacteria Monitoring Detections
- Bacteria Standards Violations
- Treatment System Failures
- Waterborne Disease Outbreaks
- Loss of System Pressure
- Water Main Breaks
- Other Interruptions in Service

The DEQ has developed policy regarding BWAs to help guide staff, provide consistency, and maintain public health. A copy of DEQ policy ODWMA-399-022 is attached.

BWA's may be self-initiated by the water system, issued collaboratively in consultation with the DEQ, or when necessary mandated by the DEQ. Requesting customers to boil the water when bacterial contamination has occurred provides an added barrier of public health protection.

The BWA's which recently occurred in the City of Flint were associated with bacteria monitoring detections and violations of bacteria standards. These advisories were issued by the City of Flint collaboratively in consultation with the DEQ.

Current regulations regarding monitoring and standards for bacteria in water distribution systems were developed by the EPA, have been in effect since 1990, and incorporated into the Michigan Safe Drinking Water Act. There are a variety of bacteria, parasites, and viruses which can potentially cause health problems if humans ingest them in drinking water. Testing water for each of these potential pathogens would be difficult and expensive. Instead, water systems test for Total coliform and E.coli. Total coliform bacteria react to water treatment in a manner similar to many pathogens. Therefore, the presence of total coliform in drinking water indicates there may be a pathway for pathogens or other contaminants to enter the system. The absence of total coliforms in the distribution system minimizes the likelihood that pathogens are present. E.Coli is itself a pathogen, and its detection would be direct evidence of a health risk.

Once a BWA has been issued, time is needed to investigate potential causes and implement corrective measures. The larger the water system, the more time this may take. Once corrective measures have been taken, samples must be collected and analyzed to confirm that bacteria are no longer present. Using the most common analytical method, samples must be incubated for a period of 24 hours before results can be obtained. In situations where the bacterial contamination has been confirmed, two consecutive rounds of safe samples collected at least 24 hours apart are normally obtained before canceling a BWA. Adding each of these steps together, a normal response period to cancel a BWA under these circumstances would be expected to take at least 3 to 4 days.

Recent History of City of Flint Water System

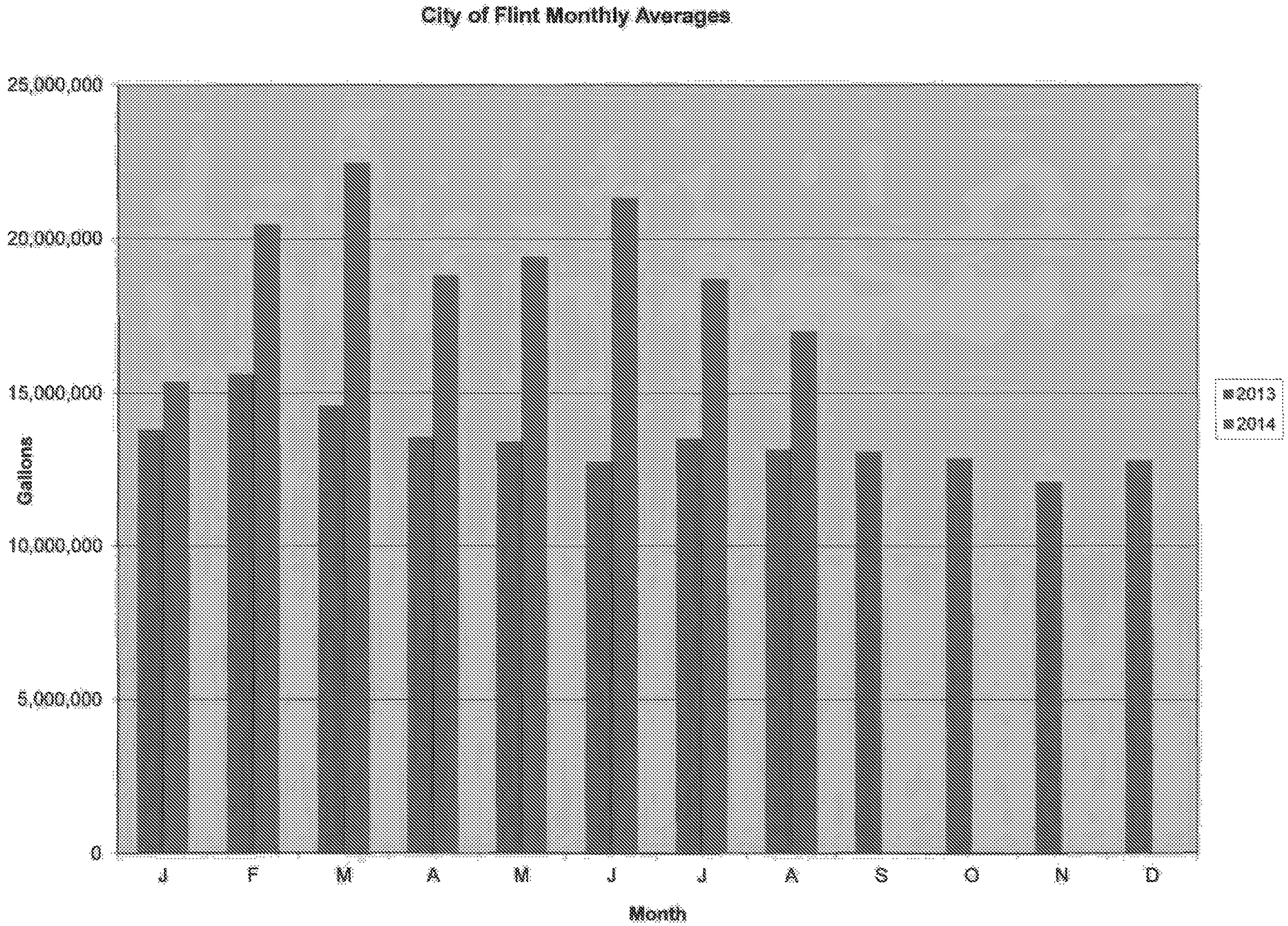
Historically the City of Flint had been a customer of the Detroit Water and Sewerage Department (DWSD) while simultaneously maintaining the City of Flint WTP to provide emergency backup service using the Flint River. The WTP performed quarterly test operations to maintain readiness and was utilized twice in 2009, supplying water once for 2 days and the other for 3 days.

In April 2013, the City of Flint notified DWSD that it would be terminating service in the future and contracting for raw water service from the Karegnondi Water Authority (KWA). Work on the KWA pipeline from Lake Huron broke ground in June 2013 and is expected to be completed with connection in late 2016.

In August 2013, Rowe Professional Services Company completed an engineering proposal for improvements to the City of Flint WTP that would allow continuous operation of the WTP utilizing the Flint River in lieu of continuing service from DWSD until completion of the KWA pipeline. In March 2014, the City of Flint entered into a Consent Agreement with the DEQ regarding the Flint WTP lime sludge facility. In April 2014, the DEQ issued a construction permit for improvements to the Flint WTP. On April 25, 2014 the City of Flint began continuous operation of the WTP, using water from the Flint River and discontinued the purchase of water from DWSD.

A BWA was issued from August 15–20, 2014, for a portion of the City of Flint due to localized detections of Total Coliform and E.Coli bacteria. Another BWA was issued from September 5-9, 2014, due to localized detections of Total coliform bacteria in the same and adjacent portions of the City of Flint. The advisory covered an area approximately 6 square miles. The City of Flint has a total land area just over 34 square miles.

While many of the BWA contributing factors listed above require long term solutions, the City has taken operational steps to limit the potential for a BWA to reoccur. The City has increased flushing of water mains to limit residence time, maintain disinfectant residual, and help remove buildup and deposits within the piping. The City is boosting chlorine disinfectant residual at locations in the distribution system as needed. The City continues to investigate water leaks, water main breaks, and the status and condition of system valves.


City of Flint Monthly Averages
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
Gallons
J
F
M
A
M
J
J
A
S
O
N
D
Month
2013
2014

Flint PbCu sample results 7/1/15 - 12/31/15				
Sample Date	Location	Sample Point	Pb in ppm	Cu in ppm
7/2/2015	212 Browning	refridgerator water line	0	0
7/2/2015	628 Frost St	kitchen	0.009	0.06
7/2/2015	202 Browning	kitchen	0.002	0.07
7/6/2015	625 S. Grand Traverse	utility sink	0.003	0
7/6/2015	2110 Mountain Ave	kitchen	0.006	0.05
7/6/2015	413 Burrough Ave	kitchen	0	0
7/9/2015	2106 Pierce St	kitchen	0.007	0.06
7/9/2015	818 Lyon St	kitchen	0.005	0
7/11/2015	1150 Woodside Dr	kitchen	0.03	0.06
7/13/2015	604 Chalmers St	kitchen	0.002	0.06
7/13/2015	3710 Fox Croft Cr.	kitchen	0.002	0
7/13/2015	2107 Calumet St.	bathroom	0.005	0.08
7/14/2015	341 Robbie Ln	kitchen	0.003	0.14
7/15/2015	2553 Swayze	bathroom	0.006	0.15
7/16/2015	421 Lyon St	kitchen	0.007	0.21
7/17/2015	1509 E. Court St 2	small sink	0.033	0.17
7/17/2015	1509 E. Court St	kitchen	0.003	0.3
7/21/2015	3125 Dakota Ave	kitchen	0.003	0
7/21/2015	3131 Dakota Ave	kitchen	0.002	0
7/22/2015	2909 Brownell Blvd	kitchen	0.007	0.08
7/28/2015	2112 Sherff	kitchen	0.011	0.05
7/31/2015	1311 Woodlawn Pk.	bathroom	0.006	0.37
7/31/2015	3311 Hawthorne Dr.	kitchen	0	0
7/31/2015	1019 E. Fork Dr.	kitchen	0	0.07
8/2/2015	1911 Tuscola	kitchen	0	0.06
8/7/2015	1623 Neome Dr.	bathroom	0.028	0
8/25/2015	2023 Miller Rd.	kitchen	0	0
8/26/2015	1201 Maxine St.	kitchen	0.002	0.08
9/1/2015	2553 Swayze	main bathroom	0.005	0
9/9/2015	1001 Dupont St.	kitchen	0.002	0.05
9/10/2015	914 Maxine St. 1	kitchen	0.004	0
9/10/2015	914 Maxine St. 2	kitchen	0.001	0
9/15/2015	1213 Beard St.	kitchen	0.006	0.07
9/15/2015	4307 Ogema Ave.	kitchen	0	0
9/16/2015	2761 Chicago Blvd.	bathroom	0.001	0
9/16/2015	1422 Clancy	bathroom	0.007	0
9/17/2015	1614 Woodlawn Park Dr.	other	0.02	0.13
9/18/2015	1025 Kensington Ave.	kitchen	0.002	0.07
9/21/2015	2616 Hillcrest	kitchen	0.005	0
9/22/2015	440 E. atherton	kitchen	0.013	0.12
9/22/2015	2801 Yale St.	kitchen	0.327	0.19
9/22/2015	5602 Baldwin Blvd.	kitchen	0.006	0
9/22/2015	1930 Colchester	kitchen	0	0
9/22/2015	NA	NA	0.002	0
9/23/2015	618 E. Sherman	kitchen	0.001	0
9/23/2015	926 Maxine St.	kitchen	0.003	0
9/23/2015	1426 Maplewood Ave.	kitchen	0.01	0.09
9/23/2015	1205 Blanchard	kitchen	0.009	0.07
9/25/2015	841 Dickinson St.	kitchen	0.008	0.15

Sample Date	Location	Sample Point	Pb in ppm	Cu in ppm
9/25/2015	3216 Hawthorne Dr.	bathroom	0.003	0.37
9/25/2015	125 E. Union St/#1	kitchen	0.001	0
9/25/2015	125 E. Union St/#6	kitchen	0.004	0
9/26/2015	401 Burroughs Ave.	kitchen	0.002	0.07
9/27/2015	3513 Bennett Ave.	kitchen	0.002	0.06
9/27/2015	1939 Laurel Oak Dr.	kitchen	0.002	0.15
9/28/2015	704 Garland St.	kitchen	0.002	0.11
9/28/2015	705 Garland St.	kitchen	0.001	0.34
9/28/2015	218 University Ave.	kitchen	0.006	0
9/28/2015	605 Garland St./1	kitchen	0.004	0.16
9/28/2015	605 Garland St./2	Drinking Fountain	0	0.22
9/28/2015	2607 Walter St.	kitchen	0.002	0
9/28/2015	unknown	unknown	0.012	0.15
9/28/2015	224 Fourth St.	kitchen	0.075	0.57
9/28/2015	528 S. Lynch St.	kitchen	0.003	0
9/28/2015	2717 Concord St.	kitchen	0.004	0.12
9/28/2015	2430 Bassett Pl.	bathroom	0.007	0
9/28/2015	1210 Walker St.	kitchen	0.03	0
9/29/2015	2426 Bassett Pl.	kitchen	0.002	0.06
9/29/2015	2422 Bassett Place	kitchen	0	0.14
9/29/2015	3729 Woodrow Ave.	kitchen	0	0
9/29/2015	3617 Churchhill Ave.	kitchen	0	0.05
9/29/2015	418 W Pulaski	kitchen	0.001	0
9/29/2015	1126 Woodside Dr.	kitchen	0.006	0.1
9/29/2015	1222 Ingleside Ave.	kitchen	0	0.27
9/29/2015	1308 Walnut	kitchen	0.005	0.05
9/29/2015	2319 Bagley	kitchen	0.041	1.04
9/29/2015	605 Chandler	kitchen	0	0.33
9/30/2015	1206 Willow St.	kitchen	0.003	0
9/30/2015	2708 Crestwood Dr.	kitchen	0.018	0.29
9/30/2015	2708 Crestwood Dr.	kitchen	0.002	0
9/30/2015	2721 Coventry Ct.	kitchen	0.006	0.15
9/30/2015	4214 Kellar Ave.	bathroom	0.002	0
9/30/2015	904 E. 7th St.	kitchen	0.005	0
9/30/2015	927 Kensington Ave #2	kitchen	0.002	0.41
9/30/2015	927 Kensington Ave	bathroom	0.009	0.17
9/30/2015	1210 Kensington	kitchen	0.005	0
9/30/2015	3014 Begole St.	bathroom	0.003	0
9/30/2015	3705 Whittier Ave	kitchen	0.001	0.07
9/30/2015	3120 Norwood Dr.	bathroom	0.011	0
9/30/2015	2207 Hills St.	kitchen	0.003	0.1
10/1/2015	602 W. Stewart	kitchen	0.007	0.2
10/1/2015	1359 Donaldson #2	bathroom	0	0
10/1/2015	1359 Donaldson	kitchen	0	0.08
10/1/2015	612 E. 3rd St. Apt #3	kitchen	0.002	0
10/1/2015	3701 N. Averill Ave.	kitchen	0	0
10/1/2015	819 Kensington	kitchen	0.001	0
10/1/2015	4219 Greenlawn Dr.	kitchen	0.001	0.07
10/1/2015	1329 Washington	kitchen	0.01	0
10/1/2015	533 Macdonald	kitchen	0.001	0
10/1/2015	932 Kensington Ave	kitchen	0.004	0.23

Sample Date	Location	Sample Point	Pb in ppm	Cu in ppm
10/1/2015	G3139 Hogarth Ave #1	Duck Drinking Fountain	0	0.17
10/1/2015	G3139 Hogarth #2	School Drinking Fountain	0.002	0.22
10/1/2015	G3139 Hogarth Ave	kitchen	0	0.07
10/1/2015	1005 Kensington Ave	kitchen	0.001	0.05
10/1/2015	1002 Kensington Ave Apt #1	kitchen	0.003	0
10/1/2015	1006 Kensington Ave	kitchen	0.004	0
10/1/2015	23009 Pierce St. #2	refridgerator	0	0
10/1/2015	2309 Pierce St.	kitchen	0	0
10/1/2015	1319 Beard St.	kitchen	0.007	0.41
10/1/2015	1001 Kensington Ave	kitchen	0	0
10/1/2015	540 S. Saginaw St.	kitchen	0.002	0.92
10/1/2015	736 Waldman	kitchen	0.001	0
total samples as of 10/7/15 = 112			9 over AL	0 over AL
		90th percentile	11.0 ppb	262 ppb

City of Flint, Michigan
Office of the City Administrator

Memo

To: Dayne Walling, Mayor

From: Natasha L. Henderson, City Administrator

cc: President Freeman and Councilmembers

Date: October 20, 2015

Re: Water Filtration Plant and Water Distribution Internal Review

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Water Filtration Plant and Water Distribution Systems Overview

The City of Flint's water filtration plant and distribution system have experienced many challenges over the past two years and it is of grave concern that we reflect upon the decisions that have been made and understand how we will proceed in the future. First, and foremost the City will conduct an internal review of the steps that were taken in 2013 when the agreement with Karegnondi Water Authority (KWA) was signed.

In the wake of recent water concerns, I have developed a proactive and comprehensive plan showing the City's commitment to deliver high quality water, address its aging infrastructure, and maintain a qualified staff. I am outlining a series of steps that the city will take to not only ensure that these goals are met but a plan that is designed to start rebuilding community trust through action and transparency.

In addition, with the assistance of the EPA Task Force, Michigan Department of Environmental Quality, and Safe Drinking Water Technical Advisory Committee, the following steps are meant to go into effect as quickly as possible with all goals being accomplished by the time KWA begins delivering raw water.

- Independent review
- Processes & Testing
- Training

- Technology
- Communication
- Lead Lines
- Capital Improvements

Independent Review

We will seek to commission an independent source to review the technical and operational steps that occurred from the time the City signed on to the KWA to present. This is meant to internally perform an after action review in order to clearly assess the decisions that were made. My expectation is that we will hire out-side legal counsel to lead this internal review. I believe it is imperative that the City has all information that has led the City to the water quality issues that have arisen.

Internal Processes & Testing

We understand that EPA standards are the minimum requirements that utility systems are required to meet, the City will establish and move forward with higher standards and goals than those set by regulators. As these new standards are set, they will be published with a plan on how to obtain each goal complete with expected timeframes. The following are the first set of goals that have been set by the City that exceed the regulatory requirements.

Regulatory Requirements	City Goals
(1) F-1 Licenced Personnel	(2) F-1 Licenced Personnel
(1) S-1 Licensed Personnel	(2) S-1 Licensed Personnel
100 TTHM Samples per Month	120 TTHM Samples per Month
100 Lead/Copper Volunteer Samples / yr.	300 Lead/Copper Volunteer Samples / yr.
Annual Water Quality Report	Quarterly Water Report

Training

We will encourage all utility employees to become members of the American Water Works Association (AWWA) which is the largest nonprofit, scientific and educational association dedicated to managing and treating water. The AWWA offers continual training opportunities and the City will develop an internal training regimen that employees must adhere to. The goal is to continue to develop each employee which promotes a long term succession plan.

Technology

The addition of enhanced Supervisory Control and Data Acquisition (SCADA) will make sure that the system is running with the industries most updated technology and running as efficient as possible. The SCADA adds automation to the Water Plant thereby reducing the need for as much manual intervention. The City will also maintain Safe Drinking Water Technical Advisory Committee with more consistent meetings.

Enhanced Communication

We recognize that one of the key features of a Utility is the public communication with honest and candid information. We will increase the way we send information to people and the frequency that our communication is available. The following are first steps in that direction.

- Monitors around City Hall that display information about the water system

- Direct emails to individuals and neighborhood groups informing people where work is occurring
- Door hangers for field workers to distribute alerting people when water may be off or discolored
- A website page and GIS map dedicated to water events
- Quarterly Water reports that are directly mailed to users
- More frequent press releases that provide information relating to infrastructure concerns
- Immediate notification using all of the above media if a violation occurs
- An answering service so that every call is answered in a timely manor

Lead Service Lines

Every effort will be made to ensure a program will is in place to address the long-term goal of replacing all lead service lines. The program is expected to address the location of all City owned lead service lines and look to provide an opportunity for homeowners to receive a grant in order to have their service line changed at the same time as the city is changing its lines. This coordinated program will look to utilize funds from multiple avenues to support City residents, such as:

- CDBG Funds
- DWRF revolving loan funding
- Grant funding

Capital Improvement Plan

The City will continue to modify its 5-year CIP annually to make sure that we are always addressing the most critical issues facing the City. Another rate study will help set the correct rate for the system and determine the proper allocation to address concerns. The Water Reliability Study will continue to highlight the critical needs and will continue to be updated every two years.

As City Administrator, my goal is to ensure all of the necessary steps are in place prior to the implementation of KWA delivering water to the City. All of these initiatives will be inserted into the Utilities strategic plan and tracked regularly by staff, myself, and reported to the DPW Committee to ensure accountability.

Benzie, Richard (DEQ)

From: Busch, Stephen (DEQ)
Sent: Tuesday, March 26, 2013 3:45 PM
To: Benzie, Richard (DEQ); Donaldson, Kristina (DEQ); Bloemker, Jon (DEQ)
Cc: Shekter Smith, Liane (DEQ)
Subject: FW: Flint Draft Response

At 1:30 today Mike Prysby and I attended an unplanned conference call between Director Wyant and Treasurer Dillon. Prior to the conference call I provided the director what I had put together at that point (see email below).

There was follow up discussion with the Director following the call and in addition to the response below he would like us to be prepared to discuss the following points:

1. Can we say to Treasury that KWA is a cost effective option?
2. Can we say to Treasury that DWSD is a cost effective option?
3. Regulatory authority to allow/prevent water system breakups and local vs. state decisions about associated costs
    a. Besides Benton Township and Norton Shores/Fruitport what other systems have pulled out of a regional system and what were the DW regulatory considerations?
4. How do/can we assess the dollar value on the benefits of a DWSD Regional water system vs. the cost differential?
    a. In the TYJT report, the status quo option for Flint with DWSD vs. KWA cost estimate differential is $172 million.
5. What unanswered questions do we have about the DWSD options in the TYJT report?
    a. 8/12 Blend
    b. 12/8 Blend

I am still planning on a ODWMA meeting/conference call tomorrow morning at 9:00 to address the above and addend any additional comments before I provide a final response to the Director Wednesday afternoon in preparation for Thursday meetings.

Call me if you have any questions.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

From: Busch, Stephen (DEQ)
Sent: Tuesday, March 26, 2013 12:37 PM
To: Wyant, Dan (DEQ); Thelen, Mary Beth (DEQ); Sygo, Jim (DEQ)
Cc: Willard, Veronica (DEQ); Shekter Smith, Liane (DEQ)
Subject: Flint Draft Response

Director Wyant,

In preparation for our call today with Treasurer Dillon's office, ODWMA has developed the following for consideration. We can provide any additional info you require during the meeting.

ODWMA has reviewed the materials developed by the consultant Tucker, Young, Jackson, Tull, Inc. (TYJT) for Treasury regarding the City of Flint and potential alternatives for public water supply. Based on our reviews, we have developed the following comments to this point in our analysis:

1. The TYJT report does not contain the full scope of the Karegnondi Water Authority (KWA) raw water supply system. TYJT concerns over raw water supply redundancy and reliability are addressed to the satisfaction of ODWMA under the full

KWA proposal. Please note some portions of the overall project are being financed independently by the Genesee County Drain Commission.

2. There are significant differences in contract language between KWA and Detroit Water and Sewerage Department (DWSD) with respect to the contracted maximum day demand capacity.
    a. Under a KWA contract, a "maximum day" capacity of 18 million gallons per day (MGD) would fully satisfy current demands of the City of Flint, without the need to supplement raw water capacity using the Flint River. (18 MGD, average over a 30 day period).
    b. Under a DWSD model contract, a "maximum day" capacity, even at 18 MGD, would not satisfy the current demands for the City of Flint. (18 MGD, over any 24 hour period).

3. Restrictions in contracted capacity that would prevent the City of Flint from meeting peak demand requirements present potential limits to economic development within the City of Flint, including possible connection bans and water system extension bans. This information was previously conveyed to the City of Flint by ODWMA staff.

4. All contract options with DWSD that are considered semi-competitive with the KWA contract do not fully supply the City of Flint, and would require the City of Flint to meet a significant, if not majority, of its water demands by treating water from the Flint River. Continuous use of the Flint River at such demand rates would:
    a. Pose an increased microbial risk to public health (Flint River vs. Lake Huron source water)
    b. Pose an increased risk of disinfection by-product (carcinogen) exposure to public health (Flint River vs. Lake Huron source water)
    c. Trigger additional regulatory requirements under the Michigan Safe Drinking Water Act (LT2ESWTR)
    d. Require significant enhancements to treatment at the Flint WTP, beyond those identified in the TYJT report (see item X below).
    e. Water Resource Division is evaluating potential impacts to NPDES wastewater discharge permits in downstream segments of the Flint River.

5. The TYJT report does not adequately address increased requirements and costs associated with using the Flint River as a significant source for the Flint WTP, which are not necessary under a Lake Huron source water scenario. This includes:
    a. The need to provide softening treatment
    b. Limitations on disposal options for lime softening sludge
    c. Increased ozone capacity, UV disinfection
    d. Additional backup power, more power required for Flint River operation

6. The Flint WTP must operate at some minimum level and within a range of flow rates to maintain treatment effectiveness. Currently that minimum level is 9 MGD. This level may be reduced with additional capital costs to modify the WTP, not addressed in the TYJT report.

7. Allowing Flint WTP to blend water with DWSD sets a new precedent that could pose future consequences with other DWSD customers.

8. Costs impacts to remaining DWSD customers would be similar under the proposed scenarios, only retaining 8 MGD of 30+ MGD total Flint/Genesee Co. demands, based on the following:
    a. Genesee County distribution system demands are pulling out of DWSD regardless of the decisions by Flint WTP
    b. Flint's need to utilize the Flint River as a source

9. ODWMA anticipates cost savings under the KWA proposal will be leveraged to provide additional improvements to the City of Flint water distribution system, improving efficiency and providing additional cost benefits.

10. Major cost discrepancies in TYJT analysis
    a. Engineering, Legal, Administration, Contingency – TYJT appears to have effectively double charged for these costs in their KWA estimates without adequate justification
    b. Pumping facilities – TYJT cost estimate methodology does not appear to address localized market costs and does not distinguish fixed and variable costs in its comparison analysis.

11. Remaining DWSD customers in Lapeer County could potentially see water quality impacts as a result of Flint joining KWA.
    a. City Lapeer
    b. City of Imlay City

Additional response to the TYJT report has also been provided by Rowe Engineering to Flint EFM, Mr. Ed Kurtz.

ODWMA has continued to meet on a regular basis with KWA, Genesee County, and the City of Flint regarding these water supply proposals.

ODWMA will continue to provide any additional detailed analysis requested by Treasury or the DEQ Executive Office.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

DEQ	OFFICE OF DRINKING WATER AND MUNICIPAL ASSISTANCE POLICY AND PROCEDURE		DEPARTMENT OF ENVIRONMENTAL QUALITY
Original Effective Date: August 4, 2003 **Revised Date:** **Reformatted Date:** January 17, 2013	**Subject:** Lead and Copper Rule Implementation **Division/Office and Program Names:** ODWMA-Public Water System Supervision Program		**Category:** ☐ Internal/Administrative ☐ External/Noninterpretive ☒ External/Interpretive
	Number: ODWMA-399-027	**Page:** 1 of 9	

A Department of Environmental Quality (DEQ) Policy and Procedure cannot establish regulatory requirements for parties outside of the DEQ. This document provides direction to DEQ staff regarding the implementation of rules and laws administered by the DEQ. It is merely explanatory; does not affect the rights of, or procedures and practices available to, the public; and does not have the force and effect of law.

INTRODUCTION, PURPOSE, OR ISSUE:

The Lead and Copper Rule (LCR) of the National Primary Drinking Water Regulations was promulgated by the United States Environmental Protection Agency (U.S. EPA) under the federal Safe Drinking Water Act. The complexity of the rule necessitates guidance to maintain consistent implementation of the rule by field staff. Field staff include the Department of Environmental Quality (DEQ) public water supply (PWS) staff and local health department (LHD) staff. The LHDs oversee the Nontransient Noncommunity Water Supplies (NTNCWS) under authority delegated by the DEQ.

This policy replaces Water Division Policy and Procedure WD-03-019, Lead and Copper Rule Implementation, dated August 4, 2003.

AUTHORITY:

The following are the administrative rules promulgated under the Safe Drinking Water Act, 1976 PA 399, as amended (Act 399), related to the LCR (R 325.10101 *et seq.*):

- Rule 410 – Public Education and Consumer Notice of Lead Result
- Rule 604f – Corrosion Control Treatment, Source Water Treatment, and Lead Service Line Replacement
- Rules 710a, 710b and 710c – Monitoring
- Rule 710d – Reporting
- Rule 734 – Reporting of Results of Analyses
- Rule 1506 – Retention of Records

LIST OF ACRONYMS:

Act 399	Safe Drinking Water Act, 1976 PA 399, as amended
AL	Action Level
CCT	Corrosion control treatment
CDS	Combined distribution system
CDW	Community Drinking Water
CS	Consecutive Systems
CWS	Community Water Supply
LCR	Lead and Copper Rule
LHD	Local Health Department
MCS	Modified Consecutive System
mg/L	milligrams per liter
NPDWS	Noncommunity and Private Drinking Water Supplies
NTNCWS	Nontransient Noncommunity Water Supplies
OWQP	Optimal water quality parameters
PE	Public Education
POU or POE	Point of use or point of entry device
PWS	Public water supply
Rule 410	R 325.10410 and similarly throughout
WQP	Water quality parameters

DEFINITIONS:

"Improper sample" – a sample that does not meet all three of the following conditions as required in Rule 710a(2)(b):

- Sample that is one liter in volume.
- Sample that is first draw after the water has sat motionless in the plumbing for not less than six hours. Non-first draw samples may be allowed in facilities such as a prison or a hospital under Rule 710a(2)(e).
- Sample from either a:
  - Residential site cold water kitchen tap or bathroom sink tap, or
  - Nonresidential site interior tap typically used for consumption.

"Invalid sample" – a sample that meets one or more of the following conditions under Rule 710a(6):

- The laboratory establishes that improper sample analysis caused erroneous results.
- The sample container was damaged in transit.
- There is substantial reason to believe that the sample was subject to tampering.
- Field staff determine that the sample was taken from a site that did not meet sample site criteria as listed in Rule 710a(1)(c) to (e) and (h) for CWS and listed in Rule 710a(1)(f) to (h) for NTNCWS.

"Optimal water quality parameters (OWQP)" – the water quality parameters with limits, values, and dosages set by field staff under Rule 604f(3)(f) that represent optimal corrosion control treatment (CCT).

"Reduced number of sites" – the number of distribution system sites sampled for either:
- Lead and copper under the reduced monitoring column in the table in Rule 710a(3)(a) or
- WQP in Rule 710b(7)(a).

"Small, medium, or large water supply" – a water supply serving 3,300 or fewer people (small), greater than 3,300 and fewer than 50,001 people (medium), or more than 50,000 people (large), respectively.

"Standard number of sites" – the number of distribution system sites sampled for either:
- Lead and copper under the standard monitoring column in the table in Rule 710a(3) or
- WQP in Rule 710b(3)(a).

"Water quality parameters (WQP)" – parameters that are monitored for at the entry points to the distribution system and in the distribution system during the initial monitoring periods prior to CCT, during the follow-up monitoring period after CCT is installed, and during each six month monitoring period after field staff designate optimal CCT.

POLICY:

1. **Summary of Rule Requirements**

   Corrosion causes lead and copper to leach from pipes in the distribution system. The LCR requires water supplies to optimize CCT to minimize consumers' exposure to lead and copper in drinking water.

   Water supplies select and monitor distribution system sites that are most at risk of corrosion. Field staff may consider the small or medium water supply as having optimized CCT if results do not exceed the action level (AL) for lead of 0.015 milligram per liter (mg/L) and copper of 1.3 mg/L in 90 percent of sites tested during two consecutive six-month monitoring periods. Small and medium supplies that cannot demonstrate optimal CCT in two consecutive six month monitoring periods must commence CCT steps. All large water supplies must complete CCT steps, regardless of lead and copper levels. A water supply notifies consumers of the lead levels found at the site that was tested. Any supply that exceeds the lead AL must provide public education (PE) materials.

   Source water treatment or lead service line replacement may be required when an AL continues to exceed after installing CCT. This policy does not discuss source water treatment or lead service line replacement.

2. **Site Selection**

   a. Summary of Rule Requirements:
   Water supplies select distribution sites that are most at risk of corrosion and categorize each site as Tier 1, 2, 3 based on risk. If insufficient Tier 1, 2, or 3 sites are available, the sampling pool is completed with representative sites with plumbing materials

commonly found at other sites in the distribution system. As a site becomes unavailable, the site may be replaced provided the new site is selected based on Tier 1, 2, and 3 priorities. A replaced site should be explained when reporting on lead and copper monitoring.

b. Selecting Tier 1 Sites Based on Year Built:
Tier 1 sites are single family structures with:
   i. lead piping, or
   ii. lead service lines, or
   iii. copper piping and lead solder built after 1982 as per rule. It is believed that the corrosion may have stabilized in pipes of older structures built in 1982 or before, while newer pipes may continue to leach lead and copper for some time. However, due to a lead ban in 1987, structures built in 1987 or later were considered lead free. Therefore, Tier 1 sites with copper piping and lead solder are structures built after 1982 and before 1987.

c. Softeners and Other Point of Use (POU) and Point of Entry (POE) Devices:
Sampling sites with faucets that have POU or POE treatment devices, such as softeners, shall not be used as Tier 1, 2, or 3 sites unless insufficient Tiered sites are available. Field staff shall encourage water supplies to sample from a kitchen or bathroom tap that is not normally connected to the softener. If a sample of softened water is analyzed, then the water supply may consider returning to the same site to collect a sample of unsoftened water. Some residents may be able to bypass the softener at the tap. Both sample results (softened and unsoftened) will be used to calculate the 90th percentile. Sample results shall not be deemed improper on the basis that the water passed through a softener.

d. Supplies that bottle water:
An NCWS that is a water bottling plant and has fewer than 25 employees is classified as an NTNCWS, but all sampling under Act 399 is conducted at the raw water tap. All other sampling of the plant distribution system or bottling and packaging facility is done under the authority of the Michigan Department of Agriculture and Rural Development under Section 17 of Act 399, MCL 325.1017.

3. Monitoring Requirements

a. Summary of Rule Requirements:
The required number of distribution system sites is based on the population served. A water supply may sample more than the required number in a monitoring period. Supplies with fewer than five taps, must sample 100 percent of taps typically used for human consumption.

b. Monitoring Period:
Annual and triennial monitoring is conducted during the months June through September unless an alternate four-month period is designated.

c. Insufficient Number of Samples Collected:
When fewer than the required number of samples are collected, field staff issue a monitoring and reporting (M/R) violation and calculate the 90th percentile based on available data. To return to compliance with monitoring requirements, field staff should direct the water supply to monitor again in the next available monitoring period – next six-month period, for those supplies on a six-month frequency, or next calendar year, for those supplies on reduced monitoring. Establish the next due date based on the return to compliance date and the previously assigned frequency.

d. Improper Sample:
Samples deemed improper are not used to calculate the 90th percentile. A water supply may deem a sample improper by not submitting the sample to the lab for analysis. Once a sample is analyzed, only the field staff may deem a sample improper with approval from the:
   i. Community Drinking Water (CDW) Unit Chief and notification of the Field Operations Section Chief, for CWSs, or
   ii. Noncommunity and Private Drinking Water Supplies (NPDWS) Unit Chief approval and notification of Environmental Health Section Chief for NTNCWS.

To deem a sample improper, field staff investigates all samples collected in the monitoring period and analyzed. The investigation includes a review of documents that demonstrate compliance with monitoring and testing requirements (for example, the Instruction Sheets that are completed by the resident). Extended stagnation is not a sufficient reason to deem a sample improper. Encourage water supplies to select sites that are in regular use. The supply may collect a replacement sample for a sample deemed improper provided the monitoring period has not ended.

e. Reduce Monitoring for Only One Contaminant:
Monitoring cannot be reduced for only one contaminant. The monitoring frequency is the same for both lead and copper, except under partial waiver provisions. To date, field staff have not granted full or partial waivers under Rule 710a(7).

f. Reduced Monitoring When Copper Exceeds AL:
Reduced monitoring is allowed in the rule when the copper 90th percentile exceeds the AL, provided the lead 90th percentile meets the AL after optimizing CCT under Rule 710a(4)(d)(ii) and (iii). However, the DEQ believes that a supply with a copper AL exceedence should remain on a six-month frequency for both lead and copper and will not reduce the monitoring frequency when an action level is exceeded.

4. **Calculate Compliance**

a. Summary of Rule Requirements:
Steps to calculate the 90th percentile are listed in Rule 604f(1)(c). When fewer than the required number of sample results is available, the 90th percentile is calculated based on the available data. When five samples are collected, the 90th percentile is the average of the highest and second highest concentrations. When fewer than five

samples are collected, the sample result with the highest concentration is the 90th percentile.

b. All Samples Analyzed Are Used to Calculate 90th Percentile:
All samples collected and analyzed within the monitoring period are used to calculate 90th percentile. However, samples deemed improper or invalid, even if analyzed, are not used to calculate the 90th percentile.

c. Samples Collected Outside Monitoring Period
Samples taken outside the monitoring period are not used to calculate compliance. However, one exception exists – when a sample is deemed invalid and the supply has too few samples to meet the minimum requirements, the supply collects a replacement sample not later than 20 days after the date the sample was invalidated or by the end of the monitoring period, whichever occurs later, as allowed in Rule 710a(6)(d).

d. Multiple Samples From Same Site:
Multiple samples collected from the same site during the monitoring period are all used to calculate the 90th percentile (do not average the multiple results). Samples collected outside the monitoring period are not included in the 90th percentile.

5. Corrosion Control

a. Equivalent Corrosion Control Steps:
At this writing, CWS have used CCT steps as per rule rather than equivalent activities. Under Rule 604f(2)(b)(ii), a water supply may be considered by field staff to have optimized CCT if the supply demonstrates to the satisfaction of field staff that it has conducted activities equivalent to the CCT steps applicable to the water supply under Rule 604f(3). This determination is on a case-by-case basis after field staff have consulted with the water treatment specialist for CWS or the NPDWS Unit Chief and staff for NTNCWS. Field staff provide the supply with written notice explaining the basis for its decision and specifies entry point OWQPs.

b. Modification of DEQ Treatment Decisions:
Under Rule 604f(3)(h), the DEQ may modify its optimal CCT determination based on its own initiative or in response to a supply's proposal to modify existing treatment or OWQPs under Rule 604f(3)(g). Each revised determination is made in writing, sets forth the new treatment requirements, explains the basis for the decision, and provides an implementation schedule for completing the treatment modifications.

c. Change in Treatment or Addition of a New Source:
Water supplies are required to notify field staff of an upcoming long-term change in treatment or the addition of a new source under Rule 604f(2)(b)(iii)(C), Rule 710a(4)(d)(vii), and Rule 710a(7)(d)(iii). Field staff may require the water supply to conduct additional monitoring or take other actions to ensure that CCT remains optimized. If the water quality and characteristics of the new source are similar to the

supply's existing sources, then field staff may consider the new source as not adversely affecting the supply's CCT and no further action is needed.

6. Consecutive Systems (CS)

Systems must monitor as per rule based on their population. On a case-by-case basis, the DEQ may consider the entire combined distribution system of consecutive systems when establishing monitoring requirements.

a. Consecutive System Approach:
Some CS own their distribution system, but essentially have no water department. These CS purchase water retail and rely fully on the seller to provide all services including monitoring, operation, and maintenance of the distribution system. The combined distribution system (CDS) is considered one system for the purpose of complying with this rule.

b. Modified Consecutive System (MCS) Approach:
Some CS own and operate their distribution system. These CS purchase water wholesale and may rely on the seller to provide certain services through a variety of arrangements and agreements. The entire CDS is treated as one system for the purpose of determining the total number of lead and copper distribution system sites and WQP distribution system sites.

The U.S. EPA allows states to propose Modified Consecutive System (MCS) monitoring protocols for these large combined distribution systems (CDS) subject to U.S. EPA approval on a case-by-case basis. Field staff should work through Lansing central staff when proposing an MCS for a particular group of supplies to ensure consistent implementation among districts and with the U.S. EPA.

c. MCS General Requirements:
   1. The entire combined distribution system (CDS) is treated as one system for the purpose of determining the number of lead and copper tap samples. The total CDS reduced number of sites must be greater than or equal to the reduced number of sites for an individual system of equal size under Rule 710a(3).
   2. The number of lead and copper distribution system sites required in each consecutive system (CS) is based on percent of population of the CDS. Each CS collects no fewer than five samples.
   3. Each CS demonstrates compliance with sample site selection, lead and copper ALs, and monitoring requirements in the distribution system. In some wholesaler/CS arrangements, the wholesale system may agree to coordinate the collection of the samples, but the CS is responsible to comply.
   4. A CS may reduce the number of sites to no fewer than the reduced number for an individual system of equal size under Rule 710a(3). In most cases a CS is not eligible to reduce the number of sites, even if the CDS is able to reduce. The MCS number of sites is usually already lower than the reduced number for an individual system of equal size.

5. A CS that exceeds an AL returns to standard number of sites for a system of equal size until both ALs are met in two consecutive six-month monitoring periods. Reduced monitoring may apply, including accelerated reduced frequency under Rule 710a(4)(d)(v). The CS may resume MCS monitoring under the CDS protocol when the CS frequency matches that of the CDS (for example, the CS may rejoin the CDS that samples triennially, when the CS qualifies for triennial monitoring).
6. The MCS approach also extends to WQP because the purpose is to look at the entire CDS.
   (a) The numbers of distribution system sites are based on the population of the CDS. However, no minimum number of distribution system sites is required in any single CS in the CDS, provided the entire CDS meets the number of sites required. Selection of WQP distribution system sites should represent the entire CDS.
   (b) A CS that exceeds an AL must also monitor the following, if not already doing so:
      - WQP distribution system monitoring: A CS that is already monitoring for WQP in the distribution system at a reduced number of sites is not required to increase to standard number of sites unless the CDS is required to do so. However, if a CS is NOT already monitoring WQP in the distribution system and they exceed an AL, the CS must monitor WQP at the standard number of sites until both ALs are met in the most recent round of sampling.
      - Entry point monitoring: WQP and entry point lead and copper samples must be collected at each entry point that serves the CS (that is, the entry point at the treatment plant, not at the consecutive connection). In order for the wholesale supply (treating/selling supply) to perform this monitoring, the CS must inform the wholesale supply that the CS exceeded an AL.
      - Medium or small CDS monitor WQP only in monitoring periods that exceeded an AL. All large CDS monitor WQP, regardless of lead and copper levels.
      - Failure to maintain OWQP at the entry points (for all large supplies and for small and medium-sized supplies that exceed an AL after installing CCT) are excursions as outlined in Rule 604f(3)(f). An excursion is a treatment technique violation.
7. A CS that exceeds the lead AL is responsible to issue PE and to replace lead service lines as per rule.
8. The wholesale supply complies with requirements associated with CCT.

PROCEDURES:

WHO	DOES WHAT
Field staff, except as listed below	Make determinations and recommend actions requiring supervisor approval.
CDW Unit Chief for CWS or NPDWS Unit Chief for NTNCWS	Review and approve field staff's designation of improper sample.
Water treatment specialist for CWS or NPDWS Unit Chief and staff for NTNCWS	Consult with field staff as field staff determine on a case-by-case basis whether a water supply has optimized CCT using equivalent CCT steps.
CWS field staff	Work with CDW Unit staff when proposing an MCS monitoring protocol.
CDW Unit staff	Coordinate with U.S. EPA to receive approval on a case-by-case basis for MCS monitoring protocol.

REFERENCES:

See Authority section of this policy.

OFFICE CHIEF APPROVAL:

Liane J. Shelter Smith, P.E., Chief
Office of Drinking Water and Municipal Assistance

1/14/2013
Date

DEPUTY DIRECTOR APPROVAL:

Jim Sygo, Deputy Director

1/17/2013
Date

SWTR - log removal for legionella as with crypto? Legionella

Benzie, Richard (DEQ)

From: Benzie, Richard (DEQ)
Sent: Wednesday, March 11, 2015 7:33 PM
To: Shekter Smith, Liane (DEQ)
Cc: Busch, Stephen (DEQ); Prysby, Mike (DEQ)
Subject: RE: Information Request and Documentation

Liane,

Steve's initial response is below.

As I see it, we need a plan of action fast.

1) Inform DEQ management, including legislative and media liaisons; suggest additional communication with DCH
2) Prepare response to Genesee County email – did anyone in ODWMA or DEQ have any contact with Genesee County about Legionella and if so, when and what? Was anyone in ODWMA or DEQ requested to meet with Genesee County to discuss Legionella and if so, when, and did they "decline" to meet?
3) Contact Flint to alert them of County's concerns and determine their response to the January 27th FOIA request.
4) Arrange for a meeting with Genesee County and other parties as deemed appropriate by DEQ management – DCH, Flint, Governor's Office, etc.; Establish a "Lead" agency but also develop a team approach to move forward and determine an appropriate, common message as well as when such information should be shared and by whom. Determine how long has Genesee County, DCH, and Flint been aware of the increased cases of Legionella and what the message should be about delays in public notification.
5) Determine additional steps – possible monitoring protocols, premise plumbing treatment options, public precautions if any, etc.; Consider possible CDC assistance.
6) Determine if EPA will be willing to share their draft Legionella guidance document being developed by a workgroup consisting of EPA, the States of Ohio, Minnesota, Pennsylvania, Washington, Nevada, Missouri and Nebraska, and CDC. The guidance will characterize the effectiveness of treatment technologies to address Legionella and address relevant regulatory implications. The primary implication is that individual customers that install "secondary" treatment systems to remove, reduce or prevent Legionella in their premise plumbing (such as hospitals are already doing) become by federal definition, public water systems required to comply with all applicable requirements of the Safe Drinking Water Act. The guidance has been delayed by internal reviews at EPA, but they are hoping to be able to have a final document in summer of 2015.

That's all I can think of at this point. Let me know what you think.

From: Busch, Stephen (DEQ)
Sent: Wednesday, March 11, 2015 9:37 AM
To: Prysby, Mike (DEQ); Benzie, Richard (DEQ)
Subject: RE: Information Request and Documentation

Mike,

I am not aware of a meeting request from Jim Henry or the Genesee County Health Department as indicated in his email below. Did you receive any such request?

The FOIA is specifically directed to the City of Flint not the DEQ. If requested some of the information asked for regarding Total Coliform and E.Coli compliance sampling could be provided, but there may also be additional construction repair sampling data.

We can respond to Jim when you get back in, but at this point while the change in source may have created water quality conditions that could provide additional organic nutrient source to support legionella growth, there is no evidence or confirmation of legionella coming directly from the Water Treatment Plant or in the community water supply distribution system at this time.

Stephen Busch, P.E.
Lansing and Jackson District Supervisor
Office of Drinking Water and Municipal Assistance
MDEQ
517-643-2314

From: Prysby, Mike (DEQ)
Sent: Wednesday, March 11, 2015 7:35 AM
To: Busch, Stephen (DEQ); Benzie, Richard (DEQ)
Subject: Fwd: Information Request and Documentation

I am out today and will return tomorrow. Having trouble getting the attachment to open on my phone...but since it appears to be a FOIA regarding Legionella, I felt it is prudent to get this message to you. I will be available tomorrow to discuss or compile any info that we have.

Sent from my iPhone

Begin forwarded message:

> **From:** "Henry, James" <jhenry@gchd.us>
> **Date:** March 10, 2015 at 6:40:17 PM EDT
> **To:** Howard Croft <hcroft@cityofflint.com>, "Mike Prysby (DEQ)" <prysbym@michigan.gov>, Elizabeth Murphy <emurphy@cityofflint.com>, "Natasha Henderson" <nhenderson@cityofflint.com>, Jerry Ambrose <gambrose49@gmail.com>, Dayne Walling <dwalling@cityofflint.com>
> **Cc:** "Valacak, Mark" <MVALACAK@gchd.us>, "Cupal, Suzanne" <scupal@gchd.us>, "Hasan, Shurooq" <shasan@gchd.us>, "Childs, Bonnie" <BCHILDS@gchd.us>, "Hallwood, Dawn" <dhallwood@gchd.us>, "Johnson, M.D., Gary" <GJOHNSON@gchd.us>
> **Subject: Information Request and Documentation**
>
> Hello everyone,
>
> The Genesee County Health Department has made several written and verbal requests for specific information since October, 2014, including a Freedom of Information Act Request on January 27, 2015. The information still has not been received and the city's lack of cooperation continues to prevent my office from performing our responsibilities.
>
> The Genesee County Health Department has the responsibility to conduct illness investigations and consider all potential sources, this is not optional. In 2014, Genesee County experienced a significant increase of confirmed Legionella illnesses relative to previous years. Legionella can be a deadly, waterborne disease that typically affects the respiratory system.
>
> The increase of the illnesses closely corresponds with the timeframe of the switch to Flint River water. The majority of the cases reside or have an association with the city. Also, McLaren Hospital identified and mitigated Legionella in their water system. This is rather glaring information and it needs to be looked into now, prior to the warmer summer months when Legionella is at its peak and we are potentially faced with a crisis.
>
> This situation has been explicitly explained to MDEQ and many of the city's officials. I want to make sure, in writing that there are no misunderstandings regarding this significant and urgent public health issue. The Trihalomethane issues "pale in comparison" to the potential public health risks of Legionella.
>
> I am submitting the attached FOIA request again and requesting that the legal obligations of the request are met. If the information is not available, please let me know. In the past, I have requested to meet with the water plant staff and MDEQ regarding Legionella concerns. I did not receive a response from the water plant staff and MDEQ declined. I think it is in the best interest for all stakeholders that we meet and discuss the issues.
>
> Respectfully,

Optimization and Maintenance of Optimal Corrosion Control Treatment

Preliminary Assessment

U.S. EPA Flint Task Force

11/24/2015

DRAFT

1.0 Overview

The United States Environmental Protection Agency (EPA) has offered, and the City of Flint has accepted, the assistance of EPA experts on corrosion and corrosion control. This preliminary assessment is intended to document the activities and funding necessary to enable EPA to provide advice and support to the City of Flint in optimizing and maintaining corrosion control treatment under current water quality conditions as well as during and after the upcoming transition to the Karegnondi Water Authority (KWA) pipeline.

[Note: There are many other communities scheduled to transition from their current water sources to the KWA pipeline. Although the source water will be the same for the City of Flint and all communities transitioning to the KWA pipeline source, the intended treatment planned for these communities may differ and the studies undertaken for the City of Flint may or may not be suitable for use by the other communities. It is strongly recommended that the EPA Task Force discuss with the Michigan Department of Environmental Management (MDEQ) the importance of actively working with these additional communities to ensure that proper studies on optimizing and maintaining OCCT are undertaken prior to putting the new KWA source in service for all affected communities. If such studies are not currently underway, they should be initiated as soon as possible.]

2.0 Information Request

In order to provide effective advice and assistance, the EPA Task Force should request the following information from the City of Flint.

2.1 Current inventory of homes with service line information in excel or similar format.

Pipe loops are corrosion control treatment assessment tools that enable evaluation of the effects of potential water quality changes and different levels of orthophosphate treatment on the existing pipe scales in order to select the most effective treatment before the treatment is applied on a city-wide basis. The pipe loops utilize lead service lines that are actively in service and carefully extracted so that the treatment assessment is conducted with pipes that represent conditions within the distribution system. As it would not be possible to perform service line extractions in the winter without significantly altering or dislodging the scales within the pipes, the identification and extraction of lead service lines should be given the highest priority to ensure that a sufficient number of lead pipes can be identified and extracted as soon as possible. In order to identify suitable homes with lead lines, the EPA Task Force will need current records on lead service line locations to be provided as soon as possible so that sampling can be coordinated and conducted to verify the presence of lead lines.

To minimize the need for excavation, homes with the longest lead service lines should be chosen so that multiple segments can be harvested from each lead line. The lead lines would typically be the longest where the water main is located across the street from the home and the home is set back on the property with respect to the street. An estimated 20 lead pipe segments should be carefully extracted and handled using ORD-specified procedures for use in constructing pipe loops at the treatment plant.

As the scales within the service lines have been subject to significant and iterative water quality changes in a relatively short period of time, it is also necessary to extract additional lead and non-lead portions of service lines to assess the current condition of the scales within the service lines.

2.2 All lead in water testing results for City of Flint, including those not used for Lead and Copper Rule compliance.

Studies have shown that homes served by lead service lines generally have much higher lead levels than homes without lead service lines. As it is anticipated that the City of Flint's service line records will be incomplete, the lead-in-water testing data is a supplemental tool that can be mapped to identify areas of the city that may have higher lead-in-water levels which would indicate the presence of lead service lines. This information will help the EPA Task Force in the identification and extraction of lead service lines for constructing the pipe loops and in identification of areas to test the progress of corrosion control.

2.3 Identification of areas in Flint with elevated blood lead levels.

Similar to the lead-in-water testing, identification of areas (e.g. Zip codes, neighborhoods) where blood lead levels have increased since the switch to the Flint River can provide additional data which would indicate the presence of lead service lines for the identification of areas to test the progress of corrosion control.

2.4 Addresses of homes that have had water service interruptions or street disturbances (e.g., water main breaks, road/sidewalk construction, etc.) within the last year.

Streets where there have been potential physical disturbances and homes where the water service has been interrupted should be prioritized for evaluation for the presence of lead service lines as the disturbances can release very high lead and prolonged stagnation can affect the stability of the scales within the pipes.

2.5 Addresses of currently unoccupied homes.

Similar to homes where the water service has been interrupted, homes that are unoccupied should be prioritized for evaluation for the presence of lead service lines as these homes may pose a significant risk to incoming occupants if the home has a lead service line. Recently unoccupied homes also may provide important evaluation locations of water usage impacts on scale stability and lead release exposure.

2.6 Identification of the pressure zones and location of each of the water quality parameter locations (addresses) within each pressure zone used for water quality parameter measurements (pH, alkalinity, orthophosphate, chlorine, total Coliform) in the distribution system, along with copies of the water quality parameter analytical results for past 4 rounds of monitoring.

In addition to corrosion control treatment optimization, the City of Flint must simultaneously comply with all other applicable National Primary Drinking Water Regulations (NPDWRs). A system-wide assessment of the water quality will provided information necessary to ensure that any potential issues with other NPDWRs can be identified and resolved. Information regarding the water quality in the distribution system is necessary to evaluate the stability of the water quality parameters throughout the distribution system, and to detect locations that may have the highest risk of lead release, TTHM formation, or the presence of microbial contamination.

3.0 Immediate Tasks and Timeline

The following tasks should be undertaken immediately (November/December 2015)

3.1 Determination on EPA funding commitment(s) (DRA).

3.2 Discussion with Central Regional Laboratory (CRL) regarding laboratory capabilities and support (GWDWB, ORD).

3.3 Development of EPA QAPPs encompassing the following activities (GWDWB, ORD, Others*):

- 3.3.1 Verification of presence of lead service lines*;
- 3.3.2 Pipe rig construction, operation, and maintenance;
- 3.3.3 Treatment assessment monitoring;
- 3.3.4 Evaluation of lead reservoirs within service lines; and
- 3.3.5 Evaluation of scale degradation due to stagnation events in unoccupied homes and water shut-offs*.

*If these activities are undertaken by one or more of the local partners, QAPP development should be part of the agreement.

3.4 Identification of local partners that can coordinate with the EPA Flint Task Force, MDEQ, and the City of Flint, and establishment of agreements to provide assistance on field and other activities (ORD).*
[Potential local partners that have expressed strong interest and willingness to collaborate with EPA include Wayne State University, University of Michigan Flint, Michigan State University, Hurley Medical Center, and Genesee County Health Department.]

3.5 Outreach and education – specifics to be determined.
[Potential local partners Hurley and WSU have asked ORD directly if EPA can provide training/education for their staff on lead in water occurrence, sampling for lead, and corrosion/corrosion control treatment]

3.6 Assessment of information from 2.3 to verify the presence of a sufficient number of accessible homes with lead service lines that can be extracted for construction of pipe loops and to evaluate the current state and stability of the scales within the lead and non-lead portions of service lines (TBD).

3.7 Extraction of approximately twenty lead line segments with active water for construction of pipe loops, and six additional full service lines with different pipe material (two with lead and galvanized iron, two with lead and copper, and two with lead and plastic segments) for analyzing the lead reservoirs within the lead and non-lead segments of the service lines (TBD).

3.8 Risk evaluation and communication on the potential risk from physical disturbances to lead service lines, reoccupation of unoccupied homes and re-establishment of water service following water shut-offs (TBD).

4.0 Funding Needs (To Be Determined)

5.0 Proposed EPA Assistance

The narrative below describes the scope of work to be undertaken in providing assistance to the City of Flint and is contingent on adequate funding being provided.

5.1 Lead Service Line Detection Methodology Development

Verification of the presence of lead service lines is necessary for identification and extraction of lead service lines, sampling for treatment assessment, Lead and Copper Rule compliance sampling, risk evaluation and implementation of a lead service line replacement program. Blood lead level (BLL) or other lead-related health evaluations also need to be able to identify all lead sources for blood-tested individuals to prioritize risk locations and mitigation strategies. This methodology development is designed to determine if a simple water sampling protocol can give a convenient means to verify with some level of confidence, whether or not a residence has a lead service line, through relatively non-intrusive water sampling. Experience with other utilities has shown that paper records may either under or overestimate the presence of lead service lines.

The strategy to be employed is based on published protocols with improvements being researched by Polytechnique Montreal (Michele Prevost, Elise Deshommes, Clement Cartier). This requires staffing for coordination with Flint paper records, resident contact, plumbing mapping, field sampling (TBD, but estimated at 20 locations with no LSLs for "control" purposes, and 50 locations believed to have LSL for validation. Development of this protocol could involve re-sampling to test techniques, and could utilize one or more Palintest electrochemical analyzers after validation vs. ICP-MS. EPA-ORD has one Palintest analyzer which can be used. Field personnel would work closely with R5 CRL to test the limits of analytical performance of the Palintest analyzer.

5.2 Corrosion Control Treatment Optimization Evaluations

The corrosion control treatment optimization evaluations are necessarily separated into two stages. The first stage is intended to optimize corrosion control treatment with the current water source and water quality conditions. The second stage is designed to prepare for the transition to the new water source (KWA Pipeline) and water quality conditions, and to ensure that the City of Flint is able to simultaneously comply with all National Primary Drinking Water Regulations following the transition to the new source.

5.2.1 *Short-Term (Current) Lead Release Optimization Evaluation.* A lead pipe rig system will be constructed at the Flint water treatment plant with exhumed lead pipes, carefully collected and installed into the pipe rig. EPA-ORD will provide technical assistance in the rig design and construction, as well as the design provisions for chemical additions. One to two people will be required to be on-site to perform periodic chemical analyses and operate and maintain the pipe rig system, as well as to troubleshoot/repair any problems and to collect samples. Laboratory instruments for pH and colorimetric tests (chlorine residual, orthophosphate) will be needed on site. It is anticipated that the design will include a "control" loop and loops with possibly 3-4 different dosages, in duplicate. The

estimated sampling frequency would be at least three times per week, using ICP for metals and ICP-MS for lead on each sample, with one complete characterization sample before each stagnation period. Filtration apparatus will also be needed.

5.2.2 *Simultaneous Compliance Optimization Pilot Testing Prior to Flint Water Plant Treatment of KWA Water*. This effort will necessarily be more expansive than the short-term evaluation. The same control pipes would carry over, but new pipes would need to be stabilized with the current water. Upstream of the lead pipe rig, there would need to be a series of jar tests or a small pilot plant established to optimize coagulation, softening (if necessary), filtration and disinfection processes to meet disinfection byproduct (DBP) limits and microbial inactivation requirements. Investigations are also needed to assess the potential impacts of different possible treated Lake Huron water qualities on chlorine, biofilm growth, water age, microbial pathogens such as Legionella, phosphate demand and scaling potential. Pilot evaluations would be done on different unit processes using anticipated Lake Huron water, using university-run pilot plants, shipped or trucked water, etc. Some pilot evaluation analyses could be done on-site with portable analytical instrumentation as is typical. When a final water quality target is determined, the target finished water would become the source water to feed into the lead (and metal) pipe rigs, and thereafter the optimization of phosphate dosing would be done on the stabilized exhumed lead pipes in the pipe rigs. A reservoir may need to be constructed to hold processed simulated Lake Huron treated water produced by the pilot plant and fed to the pipe rigs. This evaluation must be started as soon as possible to allow sufficient time for reliable results to avoid having to conduct full-scale testing on water delivered into the distribution system that could impact Flint consumers after the switch to the KWA pipeline is made.

5.3 Lead Source/Release Diagnostic Evaluation

While the data collected from the pipe loops can provide information on the relative effectiveness of various treatment schemes, conditions at the plant are not the same as within the distribution system. Continued monitoring of lead levels at high risk sites throughout the distribution system is needed to make any necessary adjustments based on actual conditions within the distribution system. EPA estimates that approximately 45 homes will need to be identified for ongoing sampling to inform the treatment optimization process. (15 with lead & copper service line portions, 15 with lead & galvanized iron service lines and if available, 15 with lead and plastic service line portions). This evaluation is necessary for determining what the relative contributions of lead are from different plumbing sources in order to assure optimization of lead and other metal release from the service lines and premise plumbing. Two sampling rounds are the minimum expected for profile sampling which will utilize small volume samples through faucet and sink area and larger (one-liter) samples thereafter. Sampling would involve 15 sites for each combination of plumbing materials (total of 45 sites), with an anticipated 10-15 sequential samples per site for metals per sampling event. Additional samples will be collected and analyzed to characterize the water quality and the sequential samples will be analyzed for Pb, Cu, Fe, Zn, and Al. An experienced plumber or researcher will be needed to map the plumbing at each site, field personnel will be needed to collect and ship samples, and a data manager will be needed to manage the data. If dissolved vs. total metals are desired in the analyses, an addition person with field filtration skills will be needed, in addition to the lab

supplies. If meters, brass or galvanized pipe are found to be a significant source of lead, those devices should be included in the pipe rigs.

5.4 Impact of Water Use/House Occupancy on Stability and Lead Release from Lead and Other Premise Piping.

There are a large number of unoccupied homes in Flint. Homes which have been unoccupied for an extended period of time can pose a greater risk to incoming residents due to the stagnation of water within the plumbing over an extended period of time which can destabilize the scales within the plumbing and release high lead levels into the water. If access can be facilitated by the City of Flint or other organizations involved with housing, sampling will be conducted at 10-20 vacant or recently occupied homes in conjunction with a flushing program to assess how long it takes for increased water usage to improve the effectiveness of the corrosion control treatment for these homes. Sequential sampling profiles would be done for metals as well as chlorine residuals for each home. Flushing for different times would be tested and evaluated with repeated profile sampling to see if there is any improvement in lowering lead levels with increased water use.

5.5 Protocol for Exposure Estimation Sampling for Health-Related Evaluations (Premise & Building Plumbing).

This protocol development would compare various potential options for sampling to estimate the cumulative metal exposure from the drinking water in premise plumbing or schools. Comparisons would be made with manual or automated proportional sampling, tap POU units that could log water use and be disassembled and digested for metal content, and random daytime sampling protocols. Different types of POU-suitable filtration apparatus would be tested to see if designs would permit quantitative separation of dissolved versus particulate lead and other metals. Support would be needed for setting up and operating test systems, analyzing virgin and exposed filter/device materials with accumulated metals, building and installation of proportional samplers or development of protocol for resident-collected samples, rapid turn-around Lead and other water analyses of test exposure water fed into experimental systems.

5.6 Risk communication on lead service lines

Request OEJ support/assistance for the development and dissemination of risk communication material on lead service lines, including the potential risk from physical disturbances to lead service lines and lead reservoirs in other pipes downstream of lead service lines.

5.7 Pipe analyses for long-term treatment assessment and mechanisms of lead and other metals release

Optimization of corrosion control treatment requires specialized knowledge on scale chemistry as well as specialized equipment and equipment operating skills. The timeline for activities related to evaluating the progress in optimizing corrosion control treatment following the transition to the KWA pipeline source will extend beyond the current fiscal year and likely well into FY 2017. The necessary resources and expertise must continue to be made available to the Task Force for the expected duration of the project in order to ensure a successful outcome

which would enable the City of Flint to simultaneously comply with all NPDWRs following the transition to the KWA pipeline.

6.0 Timeline

The proposed activities are contingent upon available funding. As such, it is not possible at this time to develop a meaningful timeline, with the exception of the activities in Section 2.0 and some of the activities in Section 3.0 which are discussed in those sections. Once funding is secured a detailed timeline will be developed that incorporates both funded and unfunded activities. A Task Force member will be identified as the lead person responsible for ensuring the completion of each activity or group of activities to ensure that the work is completed in accordance with the timeline.

DRAFT

ROWE PROFESSIONAL SERVICES COMPANY

Large Firm Resources. Personal Attention.℠

January 7, 2013

Mr. Edward Kurtz, Emergency Financial Manager
City of Flint
1101 S. Saginaw Street
Flint, MI 48502

Subject: Review of December 21, 2012 Presentation – City of Flint Water Supply Assessment

Dear Mr. Kurtz:

As requested, we have reviewed the analysis of water supply alternatives for the City of Flint which was presented to the State Department of Treasury by Tucker, Young, Jackson, and Tull, Inc. (TYJT) on December 21, 2012. Our review is attached and summarizes the primary differences between the TYJT assessment and our previous studies and provides explanations of why we believe there are differences.

We have also reviewed the options for continued DWSD supply included in the TYJT presentation. It is not clear whether these are presented as specific offers on behalf of DWSD or included as examples for analysis, but we have noted some items which we believe should be addressed and considered as these options are compared.

If there are questions, please contact me.

Sincerely,
ROWE Professional Services Company

James E. Redding, P.E.
Vice President / Director of Engineering

Attachment

R:\Projects\04C0105\Docs\Correspondence Out\January 7 Kurtz.docx

Review of TYJT December 21, 2012 Presentation
City of Flint Water Supply Assessment
Prepared by Rowe Professional Services Company

DWSD Supply (Slides 7 through 9)

1. The 8 mgd maximum day supply by DWSD options can result in periods during the summer when most of the water to meet demands will be supplied by the City from the river. To aid in maintaining a consistent water quality, softening of the water from the river should be provided with this option, greatly increasing the City's costs.

2. Upgrades to Flint's WTP and dams will be needed for options requiring blending, since the WTP will be required to provide continuous, reliable service and compliance with recent surface water treatment regulations.

3. The rates for the options analyzed are shown on Slide 9 as "TYJT Estimates". Options and rates shown are different than presented by DWSD previously.

	DWSD 11/29/2012	TYJT Estimates
18 mgd Maximum Day - P&B	$16.24	$16.37
12 mgd Maximum Day - P&B	$16.30	$16.31
8 mgd Maximum Day -P&B		$12.68
12 mgd Maximum Day - Imlay	$14.38	$14.38
8 mgd Maximum Day - Imlay		$11.11

4. Since the rates used in the analyses are shown as estimates, are they actual offers or just presented as "what if" scenarios?

5. We assume that the Imlay options are based on transfer of the 72" main through Lapeer County to Flint. The analyses show a capital cost of $4.7 million; we assume that this is the proposed purchase / lease cost to Flint. This should be clarified along with pertinent details.

6. If the transmission main is transferred to Flint, what are Flint's responsibilities regarding service to the Lapeer County customers? If they remain DWSD customers, then Flint should receive some revenue for the use the main. It does not appear this is included in the TYJT analyses.

7. If the transmission main is transferred to Flint, we assume that the city will be responsible for the maintenance of the 50 year old main. The TYJT analysis did not include this.

8. Do the rates shown include the credit for "reliability" which had been discussed with DWSD?

9. If the point of commerce is changed from Baxter and Potter to Imlay, a new meter pit will be required. The cost of this does not appear to be included in the TYJT cost analyses.

Flint River Supply (Slide 10)

1. If any of the "blending" options are chosen, it will be necessary to upgrade the Flint WTP and dams to provide reliable, continuous service and compliance with recent surface water treatment regulations.

Data Collected (Slide 14)

1. The slide notes that Flint blending is based on DWSD supplying 2/3 and Flint supplying 1/3 of 12 MGD ADD. For the maximum day demand (18 mgd), if DWSD supplies a maximum of 8 mgd, Flint will supply 10 mgd or 56% of the total. However, such a large portion will make it more difficult to blend and achieve consistent water quality. Flint will need to soften water for these options.

Benchmarking Comparisons (Slide 16)

1. The slide subtitles are "KWA O&M Inflation Factor" and "DWSD and Flint Rate Inflation Factor". It seems appropriate to benchmark O&M costs for the KWA, because future costs of service will be dependent on how operating costs are impacted by inflation. For Flint, it does not seem appropriate that "rate inflation" from other utilities be used to determine the impact of inflation on future cost of service. Rates are impacted by inflation, but also by other factors such as debt and customer base. O&M expenses and rates are different and care should be exercised not to mix the two during analyses. The TYJT analyses apply an inflation factor (based on rates from other utilities) to the Flint WTP operating expenses, which does not seem to be consistent.

2. The KWA will supply raw water; SOCWA and YUCA both supply finished water. Regulations impact the O&M for finished water suppliers but should not impact the KWA O&M. The use of data from SOCWA and YUCA does not seem like a comparable comparison with the KWA. Finished water suppliers will have increased costs due to regulatory compliance, which really are not due to "inflation" of the costs of wages, power, chemicals, etc.

3. DWSD has a history of rates to Flint and other suburban wholesale customers. Rates tend to be quite specific to each utility, based on much more than just the costs of operating and maintenance. It appears that DWSD historical rates have not been considered in projecting future DWSD rate increases.

Capital Financing (Slide 17)

1. KWA bonds are planned to be general obligation bonds, backed by member counties.

O&M Inflation Factor (Slide 20)

1. SOCWA and YUCA are finished water suppliers; ever-changing regulatory requirements will impact their operating costs more than a raw water supplier, such as KWA.
2. KWA will be a supplier of raw water. O&M costs should primarily be limited to power and labor, with a little chemical use for zebra mussel control. KWA will not provide treatment of the water.

3. The KWA study assumed power, labor, and chemical costs increase at an annual average of 3%. TYJT indicated this is too low and suggested 5%.

4. Following are examples of historical inflation, which support the 3% as a reasonable assumption for O&M expenses (not rates)
    a. Labor- GCDC-WWS labor costs have increased at an annual average rate of 2.5% since 2003
    b. Electricity Rates in Michigan (per U.S. Energy Information Administration) have increased an average of 3.2% since 1999.
    c. The U.S. Bureau of Labor Statistics indicates that the inflation rate over the last 30 years has been an average of 2.8%.

Finished Water Rate Inflation (Slide 21)

1. TYJT bases their assumptions for rate inflation on a survey of rates from three other water suppliers, but ignored the actual rate history of DWSD. TYJT assumed DWSD rate increases of 4.4% annually (if water is purchased from P&B) and 2.9% annually (if water is purchased from Imlay). Based on the actual charges by DWSD to Flint, DWSD historical rates are as follows:
    a. 10 year increase in DWSD rates to Flint:: 10.5% annually
    b. Average annual increase through 45 year history: 6.7%

2. Note that for the KWA analyses, an inflation factor has just been applied to power, labor, and chemicals. Although higher prices for labor, power, and chemicals impacts utility rates; rates are impacted by many other factors, many of which are not related to inflation. Rate inflation will likely be different than O&M inflation. Other factors impacting rates:
    a. Debt – the amount of debt varies widely between utilities
    b. Number of customers / quantity of water sold – there are many fixed expenses with a utility, that if are distributed amongst more users/more gallons sold will result in lower rates. Conversely, if there are fewer users or less water sold, the rates are higher. Assumptions regarding future water consumption will have a great impact on "rate inflation".

3. Unlike KWA and Flint operating expenses which will increase over time based on inflation, the cost of continued DWSD service should be based on the inflation of DWSD rates, to include the increasing cost of other DWSD expenses such as debt and the impact of reduced customers / demands in addition to increasing O&M expenses.

4. Even though there could be a one-time reduction in DWSD rates through adopting the model contract, limiting peak demands, and or changing the point of commerce; it doesn't seem reasonable to assume that subsequent annual increases will only average 4.4% through the 30 year period of analysis. This is significantly less than historical performance (yet TYJT suggests that inflation for KWA O&M expenses will increase at almost double the rate of historical indicators).

Capital Financing with Revenue Bonds (Slide 24)

1. Note that the KWA bonds will be general obligation bonds backed by the member counties.

2. The 2009 KWA Study assumed 6%, 25 year financing. The interest rate for planning was reduced in the 2012 Study update to 5%, which is still higher than if bonds were sold today.

3. Financial consultants determined the charges for purchasing capacity in the KWA supply based on the estimated project cost plus appropriate financing costs. Based on 60 units of capacity, $538,764,000 will be generated for repayment of debt and project costs using the capacity charges in the KWA capacity agreement.

25 years * 60 units * $355,300 / unit =	$532,950,000
3 years * 60 units * $32,300 / unit =	$ 5,814,000
	$538,764,000

4. For a KWA project cost of $272,421,558, total P&I is $483 million. The difference of $55,500,000 is available for financing expenses (capitalized interest, bond issuance costs, etc.) and additional contingencies.

5. Bond holder reserve is not a requirement for general obligation bonds.

6. TYJT assumed that 3% interest would be earned on the bond holder reserve during the 25 year bond period. Current interest rates are less than 1% and it seems inappropriate to assume such a high rate will be earned on retained funds.

7. Bondholder reserve, if provided, should be applied against the last couple of P&I payments. The TYJT did not apply it. This will reduce their project costs.

KWA Construction (Slides 26 through 29)

TYJT has indicated that the KWA construction cost estimate is too low. The primary differences in cost estimates for the project appear to be the following components:

1. Pump Stations (Slide 27) – The TYJT estimate for the pump stations is more than double that used by the KWA ($54,573,314 vs. $24,618,080). KWA estimates were based on actual construction costs from recent projectd completed by Genesee County within the last eight years.
   a. 32mgd water pump station including two-10 MG ground storage tanks - $13.4 million
   b. 80 mgd wastewater pump station, 50 feet deep wetwell – $8.3 million
   c. 30 mgd wastewater pump station, 50 feet deep wetwell – $9.4 million

   The KWA budgeted amount seems reasonable for two pumping stations as currently planned and to be constructed in rural areas (not southeast Michigan).

2. Redundant Power – There is no need for redundant power; other provisions will provide reliability of supply.

3. Land – Preliminary engineering has continued so earlier budgets established for planning for land acquisition can be greatly reduced. Options have been obtained on all properties which must be

purchased, so purchase prices are known. It will be necessary to obtain easements for only two miles of pipeline construction. All land costs are now estimated at $1.25 million.

4. Engineering, Legal, Administration & Contingencies
   a. The October 2012 KWA estimate provided an allowance of 25% of construction cost to cover engineering, legal, administration, and contingencies (ELAC). This was reduced from the 38% allowance used in the 2009 Study because ongoing planning and design have firmed up many of the details of the project, including:
      i. The intake design has been completed and all regulatory permits obtained.
      ii. The transmission main route has been determined. Meetings with road agencies have firmed up the requirements for construction and restoration within rights-of-way. Environmental review and permitting are in process.

   b. TYJT costs for Intake Crib, Pump Stations, and Transmission Mains (Slide 30) include a 30% allowance for ELAC. These allowances (from Slides 26 through 28) total $72,139,566. In addition, Slide 30 provides the following additional ELAC costs in the project total:

Design Engineering / Pump Stations	$16,939,581
Construction Management	$14,434,410
Administration	$ 349,440
Legal	$ 831,000
Total	$32,554,431

   c. Combining this with the $72,139,566 totals $104,693,997 or 43% of the estimated construction cost. We believe that such a high allowance for ELAC is not appropriate for a project of this magnitude where preliminary engineering and some design have already been completed.

Cost Comparison (Slide 30)

1. The TYJT pump station price is too high based on costs of similar projects; costs used by KWA are based on costs of recent local projects. The KWA estimate is believed to be sufficient for the proposed pumping stations.

2. Redundant power is not required; this does not need to be included in the TYJT estimate.

3. Land for LHPS – actual price is $360,000

4. Design Engineering / PS and Transmission – KWA included engineering in the 25% ELAC allowance included in the $207,752,895 estimated cost of transmission mains; TYJT included engineering in their 30% ELAC allowance included in the $218,811,559 estimated cost. By adding $16,939,581 for design engineering, $14,434,609 for construction administration, $349,440 for administration, and $831,000; it seems that ELAC is being "double-counted". The TYJT 43% allowance for ELAC seems unwarranted for a project with a great deal of preliminary and design engineering completed. The 25% KWA allowance is believed to be sufficient.

5. Easements and land (other than LHPS) should total $1,140,000, based on current options and specific needs for easements.

Other Considerations – Redundancy / Reliability (Slide 33)

1. Unfunded Mandates/ Future Regulations
    a. The proposed KWA supply will deliver raw water; it is not anticipated to be affected by future changes to regulations. Regulations will impact the City of Flint with respect to treatment and/or distribution of finished water. The City will be subject to these requirements with any of the DWSD blending options, just as they will be responsible for them if supplied by KWA. Some compliance costs may actually be less with the higher quality Lake Huron water rather than Flint River water as the source.

2. State Goals
    a. The TYJT presentation indicates that creation of a new raw water supply is contrary to the governor's goals as suggested. However, the development of a new raw water supply provides new opportunities. Communities in Sanilac, St. Clair, and Lapeer counties will have the option to join a regional water supply and replace their small local supplies where limited supplies and high concentrations of arsenic have been a concern. The new water supply also provides great economic development opportunities. The raw water supplied by KWA will make a new commodity, raw water, available to the region. A large, low-cost supply of raw water can be a valuable resource for industries and agri-businesses. The development of a new water supply will also create construction jobs through the short term period of building the new water supply and subsequently over a longer period as new businesses and industries are developed in the area.
    b. The City of Flint and area communities will benefit as permanent jobs are created for operating and maintaining the local treatment facilities.

3. Redundancy
    a. We agree that the KWA and DWSD options are similar with respect to redundancy. Both provide the primary water supply; customers are responsible for their backup supply.

Other Considerations – Cost Slide 34

1. TYJT indicates that the DWSD 8 mgd supply option is the least cost alternative.
    a. The TYJT analysis does not include the cost of needed upgrades to the City's WTP or increased operating costs in their analysis. During summer months, water from the river will need to be softened before blending. More than half of the water supplied will be provided from the river. When the cost of upgrades to the WTP and the increased operating costs (for softening) are added to the TYJT analysis, the KWA option is less than the DWSD 8 mgd option.

2. For any of the DWSD "blending" options, upgrades will need to be made at the WTP to provide for continuous, reliable operation and compliance with new surface water treatment rules. Increased capital and operating costs for treating water from the river should be added to the TYJT costs for comparison with the other options.

3. Water from the river will require greater effort to treat than water from Lake Huron (more chemicals, power, and residuals). The TYJT analysis shows about the same O&M costs for the Flint WTP, regardless of water source. It seems that the WTP O&M costs for the KWA options should be reduced to reflect the savings from treating Lake Huron water.

4. The TYJT presentation noted that the KWA analysis did not include allowances for mechanical and process improvements within the planning period. The KWA will supply raw water. The facilities consist of pipe, pumps, and a tank. There are no treatment facilities which would be susceptible to future regulatory changes. The only improvements that seem likely would be the need to provide additional capacity. Capacity expansion is planned to be financed through capacity charges to new users.

5. The provision for redundant connections between the City's water system and the GCDC system was included in the most recent water supply agreement between the two, in 2011. Although not a KWA cost, the cost of the redundant connections should be considered with all options.

6. The $2.3 million budgeted for land by KWA was intended to cover all land requirements. Since the October update, options have been obtained on all land to be purchased and the locations of easements needed has been finalized. Total land costs are now estimated to be about $1.5 million.

7. The 2004 study included a 47% allowance for engineering, legal, administration, and contingencies (ELAC). The 2009 study reduced the allowance for ELAC to 37% because many of the details since the 2004 conceptual study had been better defined. For the October 2012 update, the allowance for ELAC was reduced to 25% because continued planning and preliminary engineering further addressed details from the earlier concepts.
    a. The detailed design (plans and specifications) and permitting have been completed.
    b. The transmission main route has been finalized. Meetings with road agencies have established requirements for construction and restoration within road rights-of-way. Environmental permitting is in process. The primary remaining unknown is pipe sizing, which is largely dependent on Flint's participation.

    It is our experience that the 25% ELAC allowance is appropriate for a project of this magnitude at this stage in the planning / design stage. The 43% ELAC allowance recommended by TYJT is excessive for a project in the design phase.

8. Flint's WTP as a backup to the KWA will be less difficult to provide for than the current arrangement as a backup to DWSD. We believe there is potential for challenges with chemistry and treatment for the proposed DWSD blending options, too.

9. It doesn't seem that oversizing the KWA capacity is a good solution for the city's water loss problems, if that is what is being suggested.

10. Yes, it would be nice if the KWA system could be constructed to firmly determine its cost and time to complete before making a decision about water supply alternatives. However, a decision is needed regarding Flint's participation so that the sizing and design can be completed, before it can be built.

Project Costs - TYJT Slides 26 through 30

	KWA	TYJT
Intake and Crib		
Construction	$22,076,850	$22,076,850
ELAC	$5,519,213	$5,519,213
Property	$2,300,000	$2,300,000
Pumping Stations		
Construction	$24,618,080	$54,573,314
Land		$75,000
ELAC	$6,154,520	$16,394,494
Transmission Mains		
Construction	$166,202,316	$167,419,530
ELAC	$41,550,579	$50,225,859
Easements		$1,166,170
Engineering		
Design Engineering		$16,939,581
Construction Management		$14,434,609
Administration		$349,440
Legal / Easements / Contracts		$831,000
Power	$4,000,000	$4,000,000
Redundant Power		$1,273,200
Total Construction	$212,897,246	$244,069,694
Total ELAC	$53,224,312	$104,694,196
Total Land / Property / Easements	$2,300,000	$3,541,170
Total Power	$4,000,000	$4,000,000
Total Redundant Power	$0	$1,273,200
Total	$272,421,558	$357,578,260
ELAC as % of Construction	25.0%	42.9%

Option	TYJT Total Cost	TYJT minus additional costs of river treatment	TYJT minus additional costs of river treatment plus redundant Flint-GCDC connections	TYJT minus additional costs of river treatment plus redundant connections less KWA reserve	TYJT minus additional costs of river treatment plus redundant connections less TYJT financing	TYJT plus Flint WTP		Adjusted Total Cost	Ranking
1 Flint WTP Only	$590,441,893							$590,441,893	3
2 DWSD 8 MGD Max Day at Imlay	$621,211,298					$771,289,948		$771,289,948	5
3 KWA 10/31/12 Update	$649,775,166	$534,615,996	$554,555,960					$554,555,960	1
4 DWSD 8 MGD Max Day at P&B	$657,167,877					$807,246,527		$807,246,527	6
5 KWA-1	$707,279,715	$592,120,545	$612,060,509		$572,731,459			$572,731,459	2
6 DWSD 12 MGD Max Day at Imlay	$707,994,386					$858,073,036		$858,073,036	8
7 DWSD 12 MGD Max Day at P&B	$742,168,081					$892,246,731		$892,246,731	9
8 KWA - 2	$766,784,313	$651,625,143	$671,565,107	$654,706,341				$654,706,341	4
9 DWSD 18 MGD Max Day at P&B	$791,202,885						$812,337,848	$812,337,848	7

b

Option for Water Supply	TYJT Projected 30 Year Total Cost	30 Year O&M Reduction for Treating Lake Huron Water	25 Year Bond Cost for Redundant Connections	Eliminate KWA Reserve	Use KWA 25 Year Capital Charge $355,300 / MGD	25 Year Bond Cost for Flint WTP Upgrades	Adjusted 30 Year Total Cost	Rank (Least to Highest Cost)
1 Flint WTP Only	$590,441,893		Included				$590,441,893	3
2 DWSD 8 MGD Max Day at Imlay	$621,211,298		Note 1			$150,078,650	$771,289,948	5
3 KWA 10/31/12 Update	$649,775,166	-$115,159,170	$21,134,963				$555,750,960	1
4 DWSD 8 MGD Max Day at P&B	$657,167,877		Note 1			$150,078,650	$807,246,527	6
5 KWA-1	$707,279,715	-$115,159,170	$21,134,963		-$39,329,050		$573,926,459	2
6 DWSD 12 MGD Max Day at Imlay	$707,994,386		Note 1			$150,078,650	$858,073,036	8
7 DWSD 12 MGD Max Day at P&B	$742,168,081		Note 1			$150,078,650	$892,246,731	9
8 KWA - 2	$766,784,313	-$115,159,170	$21,134,963	-$16,858,766			$655,901,341	4
9 DWSD 18 MGD Max Day at P&B	$791,202,885		$21,134,963				$812,337,848	7

Representative Genesee County Water and Wastewater Projects

Project	Description	All Engineering Fees	Engineer's Estimate	Bid Price	Final Construction Cost	Engineering & Contingency %
Fox Pump Station	30 mgd wastewater pump station & forcemain	$1,829,259		$12,394,273	$12,074,223	
		15.2%				
NEES Project	60" Relief Sewer - included tunneled sections		$54,707,212	$55,985,672	$69,999,429	
					28.0%	
North Water Loop	23 miles 36" and 48" transmission main, pump station, & 20 MG Reservoir	$4,102,610	$29,200,000	$23,570,110	$25,798,529	2.4%
		15.9%			11.6%	
Henderson Road PS	32 MGD Water Pump Station & Two-10 MG Tanks		$12,046,368	$12,846,077	$13,517,582	
					12.3%	
Pump Station #1	80 MGD wastewater pump station	$1,735,063	$10,269,000	$8,225,400	$8,291,277	2.4%
		20.9%			19.2%	

Notes:

Engineering Fees include all planning, soils investigation, design, construction inspection & testing, and construction management costs
Engineering Fees % is based on final construction cost
Engineering and Contengency % is based on engineering fees + amount final construction cost exceeds estimate
Final Construction Cost % is based on difference between final construction cost and engineer's estimate
NEES Project Contractor went out of business during project - increasing cost to finish project
Projects constructed within last ten years

Introductions

Purpose - Dillon
- To advise Gov on what is the best financial interests of Flint
- has battle of experts in front of him
- wants DEQ to be "umpire"
- consider other communities (Tonka Lapeer)
- still mentioning agricultural benefit?

ET - very passionate

Ambrose - Finance Dir - city
- says time is past to make decision
- city says KWA is best vs best proposal from DWSD (3rd time DWSD has given Flint proposal)
- city will save $100 - $300M over 20 yrs
- even with cost overruns & const/delays
- doesn't want Flint to be "island"
- may allow county to consolidate city operations - further future savings
- Day after Flint Council passed resolution to go to KWA DWSD issued releases trashbashing proposal + denigrating KWA's engineering estimates

- Jeff Wright
- Cost overruns charges to Flint if they delay decision - to join is the cost of "redesign" + cost of delay?
- Plan to start intake this year w transmission mains to be constructed in 2014

Dillon - wants to make recd to Governor tonight or today - KWA

Jeff Wright
- Co has pledged full faith & credit so city does not have to
- If revenues were insufficient to pay bonds the County could "assess" residents/users to make up needed revenues.

TYJT - dispute the claim that their ELAC is too high

Pump Stations

Land costs - Co/GWA spent $590,000 while TY Report says it will be $27M

Also - Detroit area labor costs - 20% greater than Flint area (geographic differences)

TYJT - DWSD proposals may be different than what Flint has seen
- An option - 36" second line to be built (twin) that would be paid for by all customers pro rated on usage?
- But proposals haven't been presented to city

DWSD staff

- 1st issue - sense of cost
  - discrepancy(ies) on ELAC, PS, etc.
  - overruns / contingencies
  - who's best to determine that?
  - will give Treasurer's opinion

2nd - Flint River issues → will give opinion - other uses, NPDES, etc.

3rd issue - impact on others
does that involve others or is it Flint's problem.

TYJT - need to get the formal offer to FRA for constructing 2nd pipe (36")
- impacts to others in DWSD

Mitonish → leave

Mayor of Flint
- west of RWA to best of DWSD
  - should be best to best or worst to worst



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